

THE DESIGN OF CONTEMPORARY SCHOOLS
FOR THAILAND

by

MANOP BONGSADADT

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Approved by:

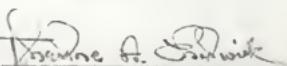

Major Professor

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INTRODUCTION

The school is a children's community. The world is created by word and model, number and deed, so that children may enter the community and the world, not merely to survive, but to contribute to it.

Education is the main objective to accomplish those goals. It has been and is recognized to be a social continuum beginning with social needs and ending with social needs. This fact is most true in a society which depends upon the positive contribution of every member in it.

Pre-primary and kindergarten are attributed for very young children to learn to live and work together, to learn to do for themselves and others, to learn to use tools, begin skills, and to play safely. The children, as individuals, gradually understand that they are parts in a social organization. The elementary school is a place further developing the knowledges made in kindergarten and the learning of subject skills. Out of activities allowing for new learnings and experiences comes the fixing of facts, the formation of habits of thinking and creating, and the building of character and appreciations. Junior high school learning is characterized by exploration. Materials learned in elementary school are further developed. It is in high school that intellectual and social experiences are placed in the context of usage. High school catches the young adolescent at a stage in life where it is practical to help him discover himself and where he can start planning his

future. Opportunities for exploration in fundamental areas as well as in such special areas as art, music, home living, mechanical art, and physical education determine the program.

In this report, the subject described is mainly education and school systems in Thailand. It is well understood that education is the basic need of all the nations. By this fact, to educate the Thai people is not only to build up manpower and the labor force, but also to establish economy, thus upgrading the living conditions of people in the country.

THE GEOGRAPHICAL AND PHYSICAL BACKGROUND OF THAILAND

Thailand is situated in the middle of Southeast Asia, with Laos, Cambodia, and Vietnam on the east, Burma on the west, and Malaysia on the south.

Its area is approximately 200,000 square miles. Thailand is slightly smaller than Texas in area. The population is 30,000,000 (census taken in 1964). A great majority of the inhabitants are Thai.

Thailand is divided into 71 Changwats, 64 of which have populations above 100,000. According to the 1964 census date, the six cities with the largest populations are the following:

Bangkok	2,000,000	Khon-Kaen	844,075
Ubon	1,130,000	Chiengrai	811,771
Korat	1,094,774	Chiengmai	789,483

Thailand may be divided into five main divisions; that is, Northern, Central, Northeastern, Southeastern, and Southern Thailand.

Northern Thailand is a great teak growing area and consists of roughly parallel mountain ranges separated by broad, open valleys. The chief cities of this territory are sites of great historical interest and beauty. They are Chiengmai, Chiengrai, Lampang, Phrae, Nan, and Sukhothai.

Central Thailand is one of the finest rice-growing regions in the world. The chief cities in this portion are Bangkok, the present capital, Ayudhya, the former capital, Nakorn Pathom, Rajburi, and Petburi. Bangkok is also the leading port, and



Fig. 1 Map of Thailand

most of the country's foreign trade passes through it.

Northeastern Thailand is a large plateau, partially enclosed by circles of mountains and bounded on the north and east by the great river, Mekong, which partly serves as a border line between Laos, Cambodia, and Ubon. Among products of special interest coming from this part of the country are silk, sticklac, hides, and rosewood.

Southeastern Thailand is famous for its coffee, pepper, fine rubies, and sapphires. The chief cities are Chandaburi, Trad, and Rayong. The first-named province is a picturesque country of forest-clad hills. It has many beautiful coast views and green jungle-clad islands.

Southern Thailand is a territory rich in minerals; rubber plantations rank next in economic importance. The chief cities are Nakorn Srithamaraj, Songkla, Pattani, and Puket.

Bangkok

The capital of Thailand is Bangkok, a city of 2,000,000 people. It is a rich modern city, which is 23 miles from the Gulf of Thailand. It is virtually a city of temples, and in regard to tourist interest, it is considered one of the most intriguing beauty spots of the Orient. Because of its unique features of numerous canals, elegant palaces, colorful temples, and shrines, Bangkok is often referred to as the "Venice of the East." Two lovely names given to Thailand itself are "Land of the Free" and "Land of Smiles." The first name is given because of the country's name "Thai," meaning "the free," and because

it has maintained independence throughout its recorded history; and the second name is given because of its hospitable people. The Thai are well-dressed and, for the most part, wear Western styles.

Religion

The national religion of Thailand is Buddhism. A very large majority of the population of Thailand is Buddhist (94%). Religion plays an important part in the daily life of the Thai people, and the thousand Wats (temples) scattered throughout the country are the cultural hubs of each community in which they are.

As for the other religions of Thailand, 3% of the population is Islamite, 1.7% is Confucian, 0.6% is Christian, and 3,000 persons are Hindus. The rest of the population belong to other religious groups or cults, or they claim no religion at all.

Language

Thai is the national and official language. Persons in better first-class hotels, shops, etc., understand English. Visitors should not have any particular language difficulties.

Currency

The Thai Baht (tical) is valued at approximately 20 baht to a U.S. dollar.

Agriculture

Thailand is predominantly an agricultural country. About 85% of the population is engaged in some agricultural occupation, usually carried on by men and women together. There have been attempts, with varying success, to introduce mechanized rice production; and tractors, reapers, binders, and combines have been ordered by both the government and private individuals.

Other crops are cotton, tobacco, pepper, sesame, soya beans, and peanuts. Thailand is also famous for her fruits, most important of which are pineapples, mangoes, bananas, mangosteens, and rambutans.

Manufacture

As an agricultural country, Thailand finds herself more and more dependent upon imports from foreign manufacturers. One chief problem now facing Thailand is how to meet its own needs for consumer goods. Thailand has embarked on several kinds of manufacturing to help correct the deficiency. Besides encouraging private enterprise, the government has launched out on the manufacture of paper, textiles, cigarettes, cigars, and liquors. Government sugar and oil refineries, canneries, tanneries, and sawmills have also been set up; however, brewing, the manufacture of cement and matches, and cold storage operations are left to private enterprise. The Thai Cement Factory has also received a concession for iron mining and smelting.

Education

The Thai people have had a written language for 700 years and have, as a result, placed a high premium on literacy during all the following centuries.

The present system of education was established in 1892 with the formation of the Ministry of Education under the Thai government.

In 1921, the first system of compulsory education was introduced. This required all children between the ages of seven and fourteen to attend school for four years of elementary education in free government schools.

There are six levels in today's educational system in Thailand.

The first is Pre-Primary or Kindergarten Education for children between the ages of three and seven. This requirement is not compulsory, but is rapidly gaining in popularity.

The second is compulsory Elementary Education (Pratom),¹ consisting of four grades for children 7-14 as mentioned above.

Third, Post Primary or Lower Secondary Education (Matayom),² consisting of three grades.

¹Pratom is the elementary grade in Thailand (Pratom 1-4 are equal to Grades 1 - 4).

²Matayom is the old secondary system in Thailand (Matayom grades 1-6 are equal to Grades 4-10).

M.S. according to the new amendment of the Secondary System (M.S. grades 1-4 are equal to Grades 6-10).

Fourth, Secondary Education (Matayom) of three grades, including vocational as well as academic instruction.

Fifth, Pre-University Education, consisting of two years for academic instruction. For educational instruction, this is a three-year course, leading to a certificate in one of the various vocations.

The Sixth and last level is that of University Education. There are seven universities and one college of Education in Thailand, which are the following: Chulalongkorn University, the oldest, University of Moral Science, Agriculture, Medicine, Fine Arts, Chiengmai University, The Northeastern University, and the College of Education.

Chulalongkorn University offers courses in Education, Commerce and Accounting, Political Science, Science, Engineering, Architecture, Arts, and the Graduate School. University of Moral Science offers Liberal Arts, Law, Political Science, Economics, Social Administration, Public Administration and Commerce and Accountancy.

The University of Fine Arts offers Painting and Sculpture, Thai Architecture, Decorative Art, and Archaeology.

The University of Medical Sciences includes Medicine and School of Nursing, Dentistry, Pharmacy, Public Health, Tropical Medicine, Medical Technology, Medical Science, and Nursing.

Chiengmai University offers Arts or Humanities, Teacher Education or Education, Architecture or Fine Arts, Social Sciences, Natural Sciences, Engineering, Medical Sciences, and Agriculture.

The Northeastern University offers Science and Arts, Agriculture, Engineering, and Medicine.

On April 1, 1961, the new system of education, "The National Education Plan," was set up. It includes Primary Education or Pathom Suksa which covers a period of seven years and Secondary Education or Matayom Suksa with a period of five years. The latter is divided into two levels--"Junior" and "Senior."

Climate

Seasons. There are three distinct seasons in Central, Northern, and Eastern Thailand: the hot (March - June), the rainy (July - October), and the cold season (November - February).

The temperatures in Bangkok vary from 62° F in December to over 96° F in April. The average variation in Northern Thailand is from 50° F during the cold season to 80° F in the hot season.

There are only two seasons in Southern Thailand--the hot season from February to September, and the rainy season from October to January. The reason for this more temperate climate is that the southern part of the country is narrow and is flanked by the sea on both sides.

Bangkok itself is located about 25 miles from the ocean. The climate is very similar to that of Hawaii, which is very hot in the summer, has very hard rains and frequent rainy storms during the rainy season. Thailand has a tropical climate, and the rain-level is as high as 100-110 inches a year,

which produces a big problem in providing a drainage system for the country.

Since the temperature varies from 60°F to 90°F and even 96°F in the hot season, Thailand has no problem in protecting buildings from snow and cold. The only problems are to keep away from the hot sun and to provide a rain drainage system. Protecting the buildings from the sun is the first major problem, because Thailand has bright, sunny skies all year long which turn normally hot weather to that of oppressive desert weather.

The eight-month rain in Thailand brings lots of problems concerning her architecture. It rains frequently and a rain lasts two to three hours each time; besides, the average M.S.L. (Mean Sea Level) is as high as three to four feet below the ground level, and this situation also causes a big problem. Instant floods during a rain in some part of the country normally occur even though there are many canals serving as the main drainage system.

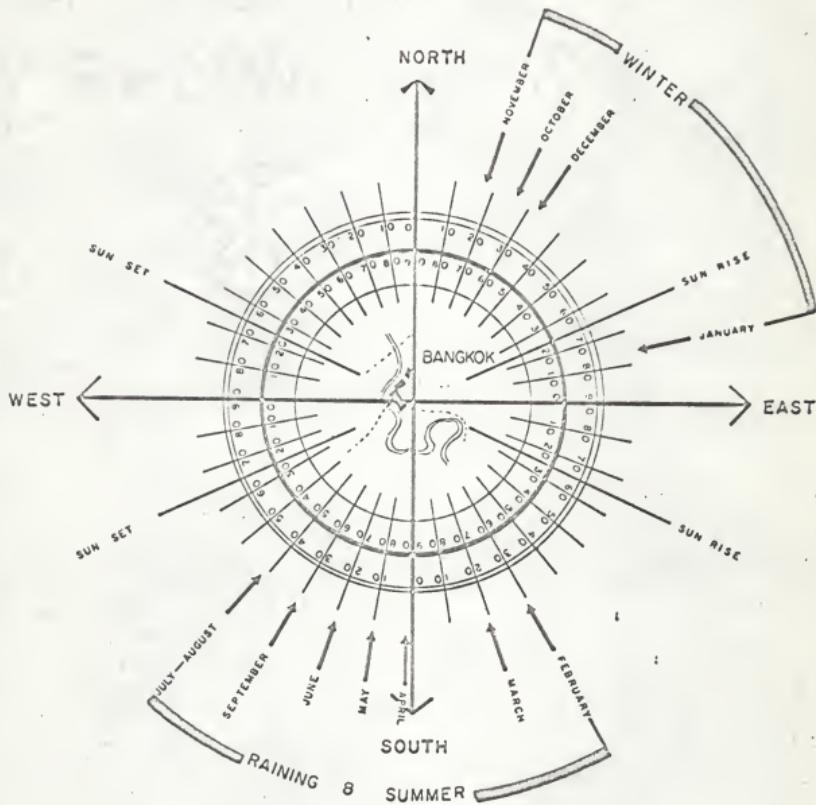
Wind Directions. Architecture in Thailand is based on her climate. Thai architects have been taught for centuries that a good design is to make use of nature as much as possible. For this reason, studying the natural climate is the basic factor in the problems of designing.

Wind is one of the most useful natural factors. Architects study the directions of the winds and design in order to gain advantage from them. For this reason, wind directions are the first thing to study before beginning a design. Wind in

Thailand varies from Southeast to Southwest during the summer and rainy season, and from West to North in winter.

FIG.2 WIND CHART OF THAILAND.

Latitude 5° - 21° N
 Longitude 97° - 106°



HISTORY OF EDUCATION IN THAILAND

The present educational system in Thailand is the product of many forces and influences which have been forged and tempered over many centuries. The first educational system in Thailand was quite similar to that of the monastic and cathedral schools of Medieval Europe in which religion was centered. The primary purpose was to provide moral and religious instruction and for all practical purposes such as to teach young boys to farm, hunt, fight, and develop some of the basic skills in handicrafts; young girls were taught farming as well as domestic skills. Only the children of the aristocracy could expect to receive training in arts and other areas associated with higher education.

The history of education in Thailand may be logically divided into three periods:

1. The period of traditional education, 1257 - 1868.
2. The period of educational expansion, 1869 - 1931.
3. The present period, 1932 to date.

The Period of Traditional Education (1257 - 1868)

In 1283, King Ram Khamhaeng, the third king of the Sukhothai period, introduced the alphabet that has been used continuously to the present time. This alphabet was modified from time to time until the present system of writing was developed.

The monastic or temple educational system which was

started after the Sukhothai period, was widespread. This system was used for the following six centuries. During this era there were few significant changes in the educational system. The government did not take an active role in education because it was felt that this was primarily the responsibility of religious leaders. Hence, the Buddhist priests or monks assumed the major responsibility for the public education.

During the Ayudhya period (1377 - 1767), the Thai people were brought into contact with the Western world. When the Portuguese and the French people came to Thailand in 1511 and 1662, they set up private schools to teach Christian and Western culture to the natives. Since that time, increasing attention was given to the development of reading and writing skills. New textbooks were compiled to further the acquisition of these skills. The impact of this emphasis is shown in the quantity and quality of literary works that were produced in this age.

With the beginning of the present dynasty (Chakri, since 1868), new emphasis was placed on improving education and encouraging cultural development in Thailand. Many works of literature and poems written even by the King himself resulted in the production of a great number of literary masterpieces. King Rama III of Chakri era, 1850-1895, being an artist, literaturer and poet, was one of the first monarchs to show great interest in public education. He urged the learned men to record their knowledge in written texts so that the information could be made available to all literate people. When King

Rama III rebuilt Wat Prachetupon, he had many texts inscribed on the stone around the temple, and this is the reason that Wat Prachetupon is popularly recognized as "The first public university of Thailand."

Thailand was brought into contact with Western countries again during the Chakri era. Presbyterian missionaries came to Thailand and started setting up schools to teach religion. American missions contributed greatly to the improvement of Thai education, especially after one of their leaders, Dr. Bradley, set up a printing press in 1837 to print Thai books. As Thailand established closer relations with the Western countries, greater interest developed in learning foreign languages. King Rama IV of the Chakri era studied English in order to better understand Western culture and politics. He, along with his children and some courtiers, hired an Englishwoman, Mrs. Anna Leonowens, to teach language in the royal palace. He also laid the foundation for a period of educational reform and expansion in the reign of his successor, Rama V.

The Period of Educational Expansion (1869 - 1931)

A modern school was established by King Chulalongkorn (Rama V) on the palace ground in 1871. This school was the first of its kind in Thailand, and its purpose was to train boys for public and civil service. It differed from other schools of the time because the latter were dedicated simply to train boys to be well-read men of good behavior. The growing need for government officials as the government expanded its

scope of work and the demand to set up a common standard for public instruction prompted the establishment of more of these schools in 1884. Some public instruction was extended to the provinces, but the principal instruction took place in the Buddhist Temple or Wat. The King Rama V era was the highlight of educational expansion in this period. The King preserved the old custom of Wat learning and, on the other hand, he curtailed the great expense that would have been involved in the construction of new schools. Through his encouragement of education, many government schools were opened and people were glad to send their children to these schools.

In 1887, the Department of Education was established, and five years later it became a Ministry. The new ministry was assigned the responsibility for cultural and religious affairs as well as educational administration. The Ministry of Education laid the foundation for educational expansion and better administration. New textbooks were written in Thai language to be used in schools, and a nationwide system of examinations was put into practice.

At the end of the nineteenth century, the systematic plan of education to broaden the national educational scheme was established. In 1898 such a scheme was formulated. It dealt with all the provinces of the Kingdom. This national scheme of education outlined the curricula contents and established grade levels within the total system of education. Another plan was put into effect in 1909 by which education was divided into streams, academic and vocational. A revised plan announced in

1913 by King Rama VI, the 3-3-2 plan of education, was adopted instead of the 3-3-3 plan. From that time on, all general educational plans were formulated on a national basis. The first Private School Act was passed in 1918. It dealt with the registration and government supervision of private schools. It was followed by the compulsory Education Act in 1921, which stipulated that all children, both boys and girls, were to go to school from the ages of seven to fourteen years. Advanced studies were offered by universities. The first university, Chulalongkorn University, was founded in 1916. Looking back at the educational development of this period, one can see that the main objective was to train young people to understand the economic and social conditions of that time.

The Present Period (1932 - present)

Thai educational history experienced a big change again in 1932. This change is recognized as the beginning of the present period. The new revolutionary government made many efforts to improve the educational system. Increased emphasis was placed on meeting the needs of the individual; even though the principal emphasis was that education should meet social needs that were in harmony with the economic and political system of the country. Many new national schemes of education were proposed. The plan of 4-4-4 education was devised the year the revolutionary government came into power. To help implement the plan an educational council was appointed as advisory body. Three years later, a new compulsory Education Act was passed. The

following year, 1936, the National Educational Scheme was amended to the form 4-3-3-2 and this form remains the basic organizational scheme. A new Private School Act was also adopted which provided for financial assistance to these schools.

Several changes took place in 1936 which moved education into a widely recognized modern system. The revolutionary government wanted to expand elementary education as fast as possible, spurred by certain "provisional articles" in the Constitution. The Constitution stated that the Parliament was to be composed of two types of members--elected and appointed as representative of people all over the country. It also stipulated that the provinces in which more than half of the adult population was literate would have full representation; with the help of these representatives, the elementary education was brought about rapidly throughout the Kingdom.

Secondary school programs were cut down to six years (Grades 5-10) in order to prolong compulsory education under elementary education. Pre-university schools (Grades 11-12) were set up to educate a select group of tenth graders who would enter a university. The higher vocational education was set up at this level for young people who would not want to enter the university. Vocational schools on the lower levels (Grades 5-7 and 8-10) were established to discourage students from enrolling in academic study and to train for some vocation because Thailand still desperately needs manpower. The government at that time concentrated on compulsory attendance in

elementary schools. The result of this procedure was that the majority of high schools became private schools. A rapid expansion under control of private secondary schools, and the concentration of educational resources took place only in the Bangkok area.

During World War II, the organization of secondary schools appeared to remain intact, but actually the activities and functions of the schools were greatly disrupted. Children were evacuated and most of the schools were closed. Many students studied at home and were permitted to take various take-home exams. Academic standards in schools continued to decline after the war ended even though industrial and living standards began to rise.

In 1951, another scheme of education was adopted, but it was essentially the same as that of its predecessor with only some slight modifications and additions. The school system was organized as follows: 4 years of elementary education, 3 years of lower secondary school, 3 years of upper secondary school, 2 years of pre-university.

The lower secondary school grades were divided into three streams: academic stream for the children who wanted to prepare to take higher education; vocational stream for those who want to seek employment earlier; and the general stream for those who do not go beyond Grade 7. On the upper lower there were two streams: academic and vocational. From Grade 10 on, three grades of higher vocational schools were organized

parallel to the two pre-university schools. It was hoped that fewer students would go on to the academic stream and that the greater number of them would take vocational and general courses. Because of the impact of World War II, the industrial labor and agricultural manpower were intensely needed. Most of the children left school after Grade 6 or 10 to obtain jobs. Thus, the need for vocational education training was eliminated.

The imbalance of enrollment has caused great concern to educational authorities. Presently, the country needs semi-skilled and skilled craftsmen. To help solve these problems, the higher education is now limited to only talented students; however, the vocational education is developing in many ways. The government is trying to adopt a policy of employing the graduates of vocational schools as teachers in elementary schools. In a few more years time, the vocational education will be widely recognized, not only in government academic schools, but also in private schools which have been flourishing in Bangkok and other big towns in the last few years.

In 1960, when a new National Scheme of Education came into being, it put a particular stress upon meeting the needs of the individual and of society. It reaffirmed the goal of the Karachi Plan (Compulsory Education through Grade 7) and introduced some significant curricular experimentation at the secondary level. The most novel change in the secondary schools is the experimental comprehensive-type high schools. The curriculum for these schools combines both academic and pre-vocational subjects. This type of education is needed to meet

the needs mainly of those who will not be continuing their education in college or university; however, it is not a barrier to such higher education.

Administrative changes in the national educational system have also been made over the past several years in order to facilitate carrying out the various new plans and curricular changes. The Kingdom was divided into 12 educational regions in 1961. Every region as well as Changwad (province) has an advisory committee that will advise and will also bring problems before the government. An agency which has legally the right to coordinate all aspects of education is the National Educational Council created in 1959.

The higher need of the development of human resources and manpower in Thailand plays a critical role in social and economic goals. Because of this situation, the government has put her emphasis on compulsory education.

By the effective Compulsory Acts of 1921, 73% of Thais will be literate at the end of 1975. And 75% of these literate Thais will advance into the secondary and higher education level.

EDUCATIONAL SYSTEM IN THAILAND

Regional and Provincial Organization

There are 71 provinces in Thailand. These provinces are divided into 12 regions. The purpose of establishing 12 educational regions in the country is to better adapt education to local needs as well as to occupational and cultural backgrounds found in particular regions. The main duties of each region are to develop educational responsibilities, improve education in the regional area, provide appropriate channels of control, and to coordinate the work of central departments and regional offices. In order to carry out the idea of adapting education to better fit local needs, the general curricula prepared by the Ministry of Education have been supplemented by syllabi prepared by the respective regions as particular needs seemed to dictate them.

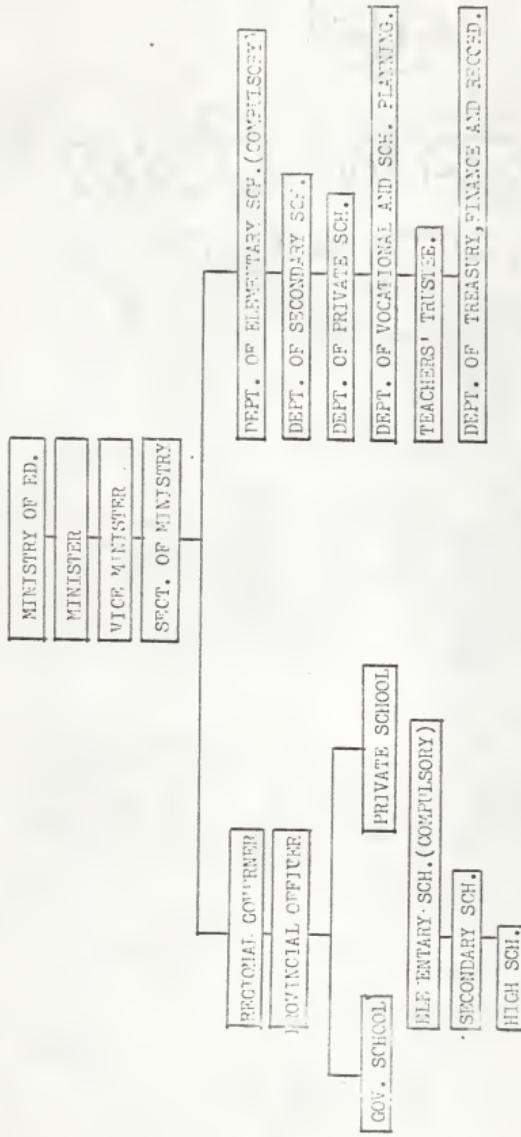
There is coordination of effort between the Departments of the Ministry of Education and regional and provincial authorities in the distribution of manuals, pamphlets, and teaching materials. Administrators, supervisors, and teachers cooperate to achieve the fullest development of the educational system within a region.

The provincial Education Offices, of which there are 71 in the Kingdom, are responsible to the Office of the Under-secretary and are governed by a Provincial Governor. It is in this office that local educational programs are administered. It handles personal matters such as salary, records, employment,



FIG. 3
EDUCATIONAL REGIONS
AND
GED CENTERS

Fig. 4 EDUCATIONAL ADMINISTRATIVE SYSTEM IN THAILAND.



and health services. The financing of the school program within the province is a major responsibility requiring extensive record keeping, auditing, and disbursement of funds.

The Regional Education Office, of which there are 12 in the Kingdom, serves several provinces as a clearing center, point of coordination and source of supervisory services. Each office is responsible to the Office of the Undersecretary of Education. The staff is comprised of various representatives of the several departments of the Ministry of Education. The executive officer is the Regional Education Officer who is responsible to the Office of the Undersecretary of Education. The remainder of the staff is assigned to the office from local schools on a loan basis and assists with clerical work.

The relationship of the Regional Education Office to the provincial Education Office is that of coordination and communication. The regional office is more closely related to a local project school regarding the planning, staff training, and program appraisal. As a matter of fact, the Regional Education Office has little relationship with the higher education because concentration is concerned only with compulsory education.

The District Education Office, which is a subdivision of the provincial structure is responsible for assisting with administrative details in individual schools, both public and private, gathering statistical data, supervising instruction, developing teaching materials, and controlling finances. The District Education Office is a subdivision of the provincial

educational unit. There are 574 districts in the Kingdom and an average of 7.7 per province. A district is determined by population density and geographical characteristics of the province.

Inspection and Supervision. The supervision of secondary education is carried out by the network of regional and provincial inspectors. There are four Inspector-Generals, each of whom is assigned to a section of the country--North Section, South Section, Central Section, and Northeast Section. In addition to these Inspector-Generals, there are 12 Regional Education Inspectors for one of each of the regions mentioned above. These officers also hold the title of Regional Education Officers, and their office serves provinces and clearing centers. All these officers are responsible to the Office of the Undersecretary of Education.

Educational Organization

The revolutionary government is interested in three main streams in developing a school system. These interests are the following:

1. Compulsory Education
2. Secondary Education
3. Vocational Education

Compulsory education came into existence by the Education Act of 1959. It stated that: "All children of January 1959 and on must continue their education at least through the level of Grade V at the age of not less than 13 years." According to

this Act, hopefully in 1973, all Thai people will be more adequately educated.

The school organization is carried on in the same way as that of the secondary school which has a school principal as the head and the curricula are advanced. All courses are taught in general in order to train pupils to advance to secondary school.

The academic educational system is responsible for the recruitment and selection of students, teaching the curricula as specified, administering personnel affairs, managing funds, maintaining records, purchasing supplies, providing and caring for instructional aids, maintaining public relations, evaluating student accomplishment and quality of teaching, and providing in-service training for the teachers. The teaching staff is scheduled to conduct classroom instruction about 200 days a year in a five-day week pattern.

The vocational agricultural school is responsible for providing a practical education for boys interested in agriculture, particularly farming. The vocational trade and industrial schools have the responsibility for providing an education suitable for entering a trade. The general subjects are to fulfill basic education goals and must serve as a foundation upon which to build vocational competency. The practical skill training is widely introduced in order to produce skilled manpower.

The girls' vocational trade schools are responsible for providing a useful education based upon the trades women follow

in Thailand. The curricula provide general education as a foundation for technical instruction to follow as well as for the cultural development of the individual.

Known as an agricultural country, Thailand puts her emphasis on the vocational agriculture school. The organization of the vocational agriculture school, as shown in the Chart on Page 31, is firmly established with clearly defined positions and responsibilities. The administrative organization typically consists of a headmaster, an assistant headmaster, and separate departments devoted to business affairs, student affairs, and instruction. Academic training and agricultural training are usually separate and are headed by different individuals. This kind of school as conceived in Thailand requires a farm laboratory on which practical instruction is carried out. This farm-like facility is departmentalized to enable students to gain experience in all phases of farm work.

School System in Thailand

Education has been categorized into four main levels according to the Education Acts Amendment of 1954. These four main levels are:

1. Kindergarten ages 3-6 years
 2. Elementary Education ages 7-13 years
 3. Secondary Education ages 14-18, 19 years
 4. Higher Education ages 18, 19-23-24 years

Kindergarten. Most of the kindergartens are private schools. Children start going to school as early as three

years of age to get acquainted with teachers and friends and to be treated as in a nursery at home. The system of teaching is based on that of a nursery school and playing area combined together. According to this plan, Kindergarten Education is not compulsory, and only the middle class and high class children are found in this school level.

Kindergarten is divided into three grades:

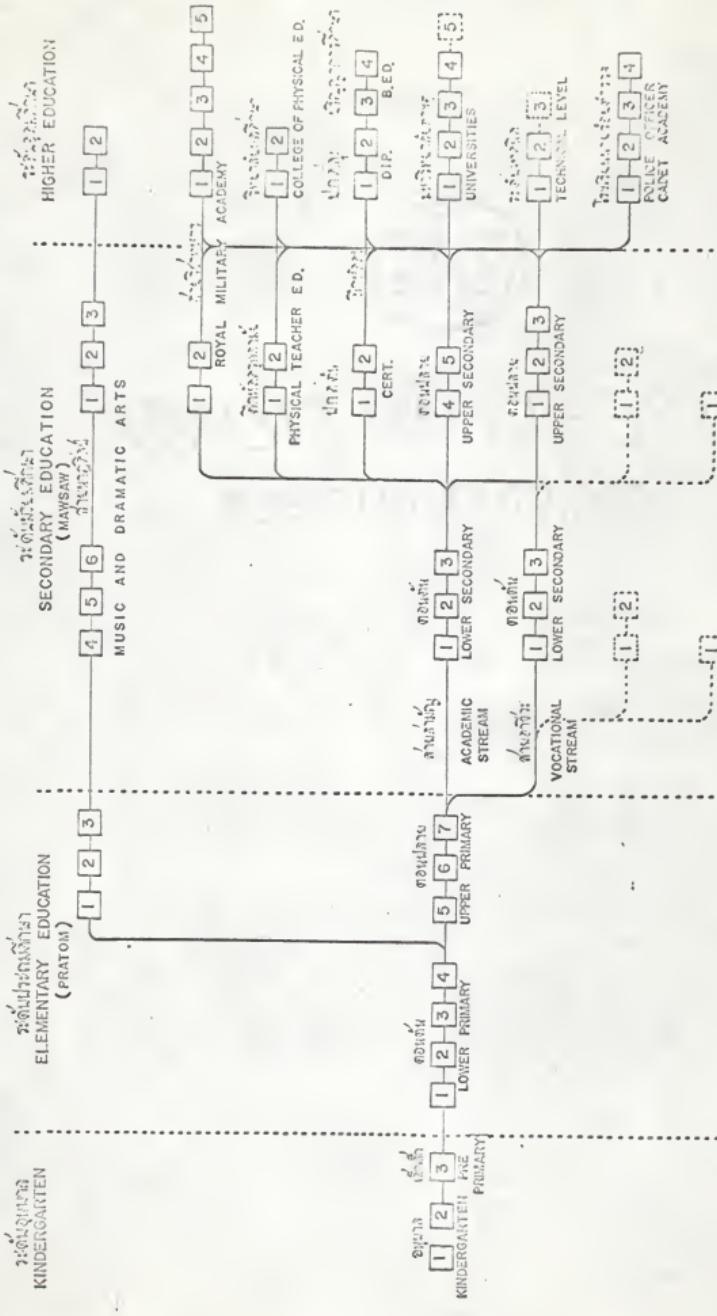
Kindergarten I	ages 3-4
Kindergarten II	age 5
Pre-Primary	age 6

The objective of having kindergarten training is to prepare children to be ready to enter elementary school. They are given a chance to group together, to be taken care of while their parents are at work. Simple basic science, biology, and mathematics are introduced to the children. Study programs are flexible according to the development of the children. School buildings are designed to have a homely atmosphere. Children are not classified into particular classes. They are allowed to mingle among groups of different ages from 3-6 years old. Eating and sleeping areas are provided in the big playroom. Most of the school is a day-care kindergarten, taking care of the children all day and providing lunch, snacks, napping and playing. It can be said that the kindergarten system in Thailand exists to provide the second home for the children in which the teachers or nurses act as second mothers.

Elementary Education (Compulsory Education). In the year 1960, the Educational Compulsory Act was passed in the

ໄລຍະກຳມືສິດທະນະບໍລິສັດຮຽນແຫ່ງດ້ວຍກຳນົດ, ປະເທດທີ່ຈຳກັດ

FIG. 5 ARTICULATION CHART OF THE SCHOOL SYSTEM BY LEVEL AND TYPE OF COURSE



MODAL AGES AT BEGINNING OF SCHOOL YEAR

- 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

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FIG. 6 COMPARISON OF EDUCATIONAL SYSTEMS

THAI SYSTEM			U. S. SYSTEM		
School	Pratom (G.)	Age	School	Grade	Age
Kindergarten	1	3-4	Nursery Sch.		3-4
	2	4-5	Kindergarten	1	4-5
Pre-Primary	3	5-6		2	5-6
	1st G.	6-7	1st G.		6-7
Primary Sch. (Compulsory)	2	7-8		2	7-8
	3	8-9	Grade Sch.	3	8-9
	4	9-10		4	9-10
	5	10-11		5	10-11
	6	11-12		6	11-12
	7	12-13		7	12-13
Secondary Sch.	1	13-14	Junior Hi.	8	13-14
	2	14-15		9	14-15
High School	3	15-16		10	15-16
	4	16-17	Senior Hi.	11	16-17
	5	17-18		12	17-18

parliament and became valid. Compulsory Education has widely spread out into far away provinces since 1960. The government has put its concentration on this level in order to increase an educated labor-force and to increase the percentage of literacy in Thailand. This Compulsory Educational Act affects children at ages from 7-13 years old and offers four lower primaries and three upper primaries. Educational curricula at this level are general. English language is assigned to the upper primary school. Science, mathematics, political science, and arts are also assigned to this level. The library is the main part of the school. It is used not only for the school itself but also to serve the communities around.

The system of having particular classrooms for particular grades is planned in order to carry a greater number of enrolled children. The laboratory, gymnasium, and music room are the second consideration, because the education at this level needs as much space as it is possible to obtain in order to handle the numbers enrolled.

The Elementary school is divided into the following way:

Lower Primary

-Pratom I	(G. I) ¹	7 years old
-Pratom II	(G. II)	8
-Pratom III	(G. III)	9
-Pratom IV	(G. IV)	10

¹G. I - first grades.

- Pratom 5	(G. V)	11 years old
- Pratom 6	(G. VI)	12
- Pratom 7	(G. VII)	13

Secondary Education. Education at this level is more advanced and more difficult. Higher mathematics, such as Algebra, Trigonometry, and Geometry, and higher science such as Biology, Chemistry, and Physics are taught. Laboratory work is widely used and is almost as important as the library. A gymnasium is a necessity for physical education. Education at this level is offered in three streams as indicated in the following chart:

(1) Academic Stream - offered 5 years

- lower secondary I	(G. VIII)	14 years old
II	(G. IX)	15
III	(G. X)	16
- higher secondary IV	(G. XI)	17

V (G. XII) 18

(2) Vocational Stream - offered 6 years

- lower secondary I		14 years old
II		15
III		16
- higher secondary IV		17

V 18

VI 19

(3) Music and Dramatic Arts - offered six years, major in Thai culture, Thai music, and Thai arts.

Higher Education. The objective in higher education is to train students to specialize in one of the special professions which are basically offered in universities. At this level, students have many chances to choose a profession. Education at this level is divided into:

(1) Universities

- offer 4 - 5 years for bachelor degrees in many fields; Masters and Ph.D.'s are also available.

(2) Royal Military Academy

- 5 years of training lead to the bachelor of education (B.Ed.)

(3) Technical Level

- 2 or 3 years of training in an industrial field earns a rank of technician.

(4) Police Officer Cadet Academy

- 4 years are offered, leading to service in the Police Department as an officer.

All of these four fields in professional education are available. Students usually enter these levels at the ages of 19 or 20 and will be graduated in a particular field at the age of 23 or 24 years.

Financing of Education

Compared with the Ministry's appropriation of the preceding year (1965), there has been an increase of 13.08% in the Government's allocation for education in the year under review. The budget received by the Ministry of Education ranked second

after that for economic development. During the fiscal years 1962-1965, the appropriations for education have accounted for approximately 17% of the total expenditure.

<u>Fiscal Year</u>	<u>Amount in Dollars (Million)</u>	<u>Percentage of Total National Expenditure</u>
1962	928.9	17.88
1963	884.8	17.05
1964	990.6	17.33
1965	1,064.05	17.4
At the year of this report		
1966	2,427.8	16.81

These budget figures for education include the allocations for universities.

Percentages of the allocations for different educational programs in 1964-1965 are as follows:

<u>Type of Program</u>	<u>Percentage 1964</u>	<u>Percentage 1965</u>
Educational Administration	7.88	8.88
Elementary Education	56.91	54.87
Secondary Education	8.42	8.55
Technical and Vocational Education and Teacher Training	11.9	11.2
University Education	11.79	14.5
Adult Education, Library, and Museum	2.48	1.26
Educational Services	0.63	0.74

In addition to the government's allocation, Thailand has received Foreign Aid for use in developing of the educational system, upgrading the teaching standard, scholarships for the students to advance their educations, and exchange teachers' programs; however, the main budgets were for building new schools and production of better qualified teachers.

Conclusion of the Educational Organization

In observing the educational system in Thailand, the Thai government puts its emphasis on compulsory education. The Compulsory Educational Acts, 1960, have been widely extended and have affected the far provinces within the last 17 years. At the present time, the percentage of literate people has highly increased. By the year 1975, 55% of the Thai students are expected to complete the education at the compulsory level, and 25% at the higher education level but under university level, and 15% at the university level. Only 5% will still be illiterate.

EDUCATIONAL STATISTICAL TABLES AND CHARTS

- Table 1. Number of Schools, Teachers, and Students
by Type of Institution and by Changwad.
- Table 2. Enrollments by Type of Institution, Sex,
and Grade.
- Table 3. Teachers by Qualification, Sex, and Type
of Institution.

TABLE 1 NUMBER OF SCHOOLS, TEACHERS AND

ประบกษาโรงเรียน

托儿所 Kindergarten			ประชานาถ ป.ต้น Local (Lower)			ประชานาถ ป.ปลาย Local (Upper)			เทศบาล Municipal		
โรงเรียน Schools	ครุ Teachers	นักเรียน Students	โรงเรียน Schools	ครุ Teachers	นักเรียน Students	โรงเรียน Schools	ครุ Teachers	นักเรียน Students	โรงเรียน Schools	ครุ Teachers	นักเรียน Students
58	628	13,083	22,407	78,393	3,127,906	1,041	10,898	574,097	455	6,051	230,472
7	122	1,863	884	4,326	161,305	203	3,422	93,574	151	2,701	108,492
3	75	1,057	140	585	22,017	47	1,264	30,868	78	1,567	68,802
—	—	—	85	708	24,437	47	623	15,997	52	774	29,338
1	22	241	101	452	16,768	21	367	11,184	4	87	2,578
—	—	—	152	658	22,828	22	230	6,136	—	—	—
1	11	275	218	1,114	42,651	27	419	12,723	2	47	1,848
1	11	206	110	473	18,995	20	299	9,405	7	119	3,868
1	3	84	78	338	13,669	19	220	7,261	8	107	4,058
—	—	—	—	—	—	—	—	—	—	—	—
3	24	456	604	2,298	77,534	61	857	21,008	24	133	5,251
—	—	—	246	948	31,066	19	299	6,864	10	55	2,219
1	9	131	250	720	25,576	19	249	8,683	6	38	1,465
1	11	252	122	399	13,494	13	149	3,543	7	34	1,283
1	4	73	78	231	7,379	10	160	3,938	1	8	284
—	—	—	—	—	—	—	—	—	—	—	—
4	37	710	1,790	6,492	256,885	132	1,335	40,591	33	411	16,409
—	—	—	191	533	18,397	25	298	8,217	2	20	1,071
1	13	286	658	2,848	102,651	30	317	9,819	14	180	7,200
1	2	52	201	784	32,510	14	138	4,595	2	30	856
1	18	316	391	1,408	57,323	34	364	10,590	8	114	4,811
1	8	75	349	1,123	45,084	20	228	7,364	9	58	2,471
—	—	—	—	—	—	—	—	—	—	—	—
3	21	503	437	1,054	68,729	57	708	21,484	10	171	6,218
1	8	192	100	805	33,318	10	229	7,811	1	39	1,535
1	8	191	111	330	10,007	15	132	3,404	3	45	1,810
1	5	120	35	168	5,048	13	185	4,709	4	88	2,121
—	—	—	48	123	3,057	8	100	2,630	2	21	752
—	—	—	143	338	15,599	11	122	2,030	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
4	35	758	1,188	4,780	187,003	130	1,760	40,823	37	300	13,542
—	—	—	210	630	27,037	25	3	0,221	1	11	301
1	9	160	138	454	19,702	12	147	4,895	6	38	1,615
—	—	—	165	713	20,264	19	209	6,097	12	98	3,590
1	11	232	248	1,110	43,447	21	200	8,211	8	118	4,379
1	7	101	72	359	10,977	24	305	9,754	6	48	1,519
1	8	175	355	1,523	60,066	29	309	11,045	4	51	2,039

STUDENTS BY TYPE OF INSTITUTION AND BY CHANGWAD

Type of Institution

มัธยมวิถีสามัญ ^{3/} Secondary			ราชภรรษ์ทั่วถูกธรรมสามัญ Private (Regular)			ราชภรรษ์ทั่วถูกธรรมพิเศษ Private (Special)			Changwed
โรงเรียน Schools	ครุ Teachers	นักเรียน Students	โรงเรียน Schools	ครุ Teachers	นักเรียน Students	โรงเรียน Schools	ครุ Teachers	นักเรียน Students	
444	9,901	159,130	2,250	35,002	771,746	658	8,028	63,400	Kingdom Total
101	3,612	59,255	856	15,529	368,643	455	2,492	58,153	Total Region 1
44	2,048	32,814	649	11,172	267,071	377	2,252	52,582	... ... Phraenakorn
28	962	16,482	189	2,753	56,376	65	172	2,431	... ... Thonburi
9	213	4,059	29	335	7,328	11	22	708	... ... Nonthaburi
6	75	1,211	15	138	3,160	1	1	25	... ... Pathumthani
7	104	1,983	28	477	9,027	8	27	217	... ... Nakornpathom
8	140	2,466	34	616	12,177	5	18	190	... ... Samutprakan
4	70	1,240	12	139	3,504	—	—	—	... ... Samutsakhon
17	299	4,897	36	614	12,143	9	38	657	Total Region 2
6	92	1,634	10	159	3,257	1	4	88	... ... Phitsanulok
8	89	1,490	12	208	3,048	1	7	162	... ... Nares-Thaiwat
4	83	1,191	13	240	6,630	7	27	387	... ... Yala
2	36	582	1	9	208	—	—	—	... ... Satun
24	473	9,186	248	3,086	60,512	28	78	899	Total Region 3
5	98	1,599	19	316	4,009	1	6	59	... ... Chumphon
8	130	2,553	114	1,223	21,776	16	61	429	... ... Nakhon Si Thammarat
3	63	1,219	20	270	4,501	7	16	108	... ... Phatthalung
6	116	2,428	63	707	19,770	2	2	140	... ... Songkhla
4	66	1,270	42	480	10,387	2	4	63	... ... Suratthani
13	272	4,277	53	674	13,778	15	60	904	Total Region 4
2	56	862	26	389	8,120	7	26	417	... ... Trang
3	47	822	6	51	1,027	—	—	—	... ... Phang-Nga
2	98	1,511	14	191	3,764	8	34	487	... ... Phuket
3	34	549	4	27	528	—	—	—	... ... Ranong
3	37	633	4	16	339	—	—	—	... ... Krabi
35	625	11,024	123	1,875	44,578	11	23	554	Total Region 5
6	73	1,492	17	189	6,007	—	—	—	... ... Kanchanaburi
4	62	872	17	280	7,081	—	—	—	... ... Prachuap Khiri Khan
8	107	1,798	10	247	6,307	2	11	348	... ... Phitsanulok
9	156	3,030	35	623	15,459	5	6	135	... ... Ratburi
6	122	2,570	21	304	6,208	1	3	34	... ... Samut Songkhram
7	115	2,050	23	343	6,330	3	3	38	... ... Suphanburi

TABLE 1 NUMBER OF SCHOOLS, TEACHERS AND

ปัจจุบันเรียน

托儿所 Kindergarten			ປະຈາກລ. ຕັ້ງ Local (Lower)			ປະຈາກປ.ປາດ Local (Upper)			ເທກນາດ Municipal		
ໂໄນເບີນ Schools	ຄູ່ Teachers	ນັກເຮັດ Students	ໂໄນເບີນ Schools	ຄູ່ Teachers	ນັກເຮັດ Students	ໂໄນເບີນ Schools	ຄູ່ Teachers	ນັກເຮັດ Students	ໂໄນເບີນ Schools	ຄູ່ Teachers	ນັກເຮັດ Students
5	63	1,610	1,558	5,842	106,203	177	1,853	49,713	39	355	12,421
—	—	—	203	840	30,448	16	128	3,275	1	12	481
1	11	221	368	1,492	47,420	49	543	15,029	10	98	3,370
1	21	662	296	987	39,707	31	335	11,367	6	85	2,232
1	18	484	257	784	25,196	29	278	5,923	10	88	3,328
1	8	94	124	495	15,455	20	197	4,898	2	17	455
—	—	—	142	645	20,529	18	225	5,505	9	58	1,918
1	9	158	168	699	17,450	16	147	3,718	2	19	837
8	77	1,625	2,327	8,009	353,280	157	1,929	64,578	37	513	18,893
1	6	159	173	535	28,736	11	111	3,445	1	17	607
—	—	—	142	457	16,933	17	142	3,913	8	63	2,363
1	12	275	522	1,709	77,705	30	442	16,237	7	128	4,485
2	18	245	335	1,217	55,254	17	188	5,817	4	71	2,510
1	13	370	333	1,113	47,164	22	303	10,218	4	49	2,022
1	8	154	297	1,010	48,484	26	300	11,651	5	52	2,045
1	8	133	279	1,032	45,223	18	266	8,469	5	69	2,620
1	12	289	246	938	33,781	18	177	4,830	3	64	2,281
5	44	844	2,763	9,040	415,417	165	1,336	41,229	34	362	14,457
1	5	113	692	2,231	122,550	37	268	9,634	6	88	3,481
1	20	355	743	2,343	106,870	48	312	9,956	12	125	6,131
1	4	93	269	734	30,606	19	189	6,801	3	35	1,252
—	—	—	267	1,009	43,632	22	214	7,087	5	22	798
1	9	180	483	1,529	67,664	21	193	4,845	4	52	2,171
1	6	103	233	921	37,894	12	108	2,955	4	42	1,624
—	—	—	78	273	6,199	6	62	951	—	—	—
4	35	726	2,705	8,703	359,832	105	1,238	36,055	16	226	7,412
1	10	242	820	3,119	117,613	32	349	10,203	5	64	2,133
1	3	80	309	798	32,022	16	160	4,764	3	28	931
1	3	50	600	1,462	68,309	18	242	6,311	2	37	1,119
—	—	—	305	734	34,388	17	177	6,841	3	31	940
1	19	354	771	2,592	117,500	23	310	6,936	3	68	2,269
5	49	1,079	3,395	11,441	410,990	143	1,662	44,834	20	275	8,754
1	3	67	404	1,542	69,148	52	256	7,586	4	37	1,373
1	9	242	489	1,438	67,087	26	308	8,376	3	42	982
1	8	128	504	1,938	66,008	20	258	6,940	5	53	1,504
1	12	246	719	2,002	60,164	18	160	4,374	3	29	1,130
1	17	393	970	3,925	130,502	67	602	17,558	5	114	3,765

STUDENTS BY TYPE OF INSTITUTION AND BY CHANGWAD (Contd.)

Type of Institution

มัธยมวิถีสามัญ Secondary			ราชภัฏวิถีหลักสูตรสามัญ Private (Regular)			ราชภัฏวิถีหลักสูตรพิเศษ Private (Special)			Changwad
โรงเรียน Schools	ครุ Teachers	นักเรียน Students	โรงเรียน Schools	ครุ Teachers	นักเรียน Students	โรงเรียน Schools	ครุ Teachers	นักเรียน Students	
54	744	12,960	173	2,365	49,496	22	55	943	Total Region 6
7	81	1,411	14	173	3,618	1	1	25	... ... Chat-Net
18	184	3,210	48	619	12,132	12	27	639	... ... Ayuthaya
7	166	2,818	47	658	14,830	6	23	224	... ... Lopburi
9	100	2,039	18	255	5,561	—	—	—	... ... Sereburi
6	76	1,180	17	245	4,978	—	—	—	... ... Singhburi
8	87	1,471	21	307	5,873	3	4	55	... ... Angthong
3	70	831	10	108	2,306	—	—	—	... ... Uthai-Thani
41	625	10,905	166	2,220	48,252	23	43	1,567	Total Region 7
2	30	418	11	93	2,113	—	—	—	... ... Komphaengphet
4	62	1,002	8	71	1,541	—	—	—	... ... Tak
6	78	1,405	69	951	20,493	11	19	1,050	... ... Nakhonratchasima
8	79	1,438	22	297	7,229	1	1	36	... ... Phichit
4	110	2,098	18	315	7,025	11	23	482	... ... Phitsnulok
6	83	1,338	14	125	2,710	—	—	—	... ... Phetchabun
8	115	2,000	12	168	3,020	—	—	—	... ... Sukho-Thani
5	68	1,208	14	202	4,121	—	—	—	... ... Uthai-Thani
35	551	10,394	110	1,897	45,199	21	62	1,046	Total Region 8
7	79	1,894	21	288	8,960	3	8	148	... ... Chiangrai
7	142	2,034	43	815	20,773	10	41	640	... ... Chiangmai
5	54	961	5	51	927	—	—	—	... ... Nan
6	98	1,998	9	160	2,459	—	—	—	... ... Phrae
8	87	1,678	24	447	11,190	8	13	258	... ... Lampang
3	61	638	8	138	2,910	—	—	—	... ... Lamphun
2	42	395	—	—	—	—	—	—	... ... Mae Hong Son
18	349	6,392	88	1,335	24,859	7	18	277	Total Region 9
3	60	1,520	33	600	11,111	5	14	184	... ... Khon-Keen
4	59	1,029	3	33	574	—	—	—	... ... Loei
3	62	1,108	19	225	3,877	2	4	93	... ... Sakon Nakhon
5	68	1,180	8	88	1,522	—	—	—	... ... Nongkhai
3	80	1,557	27	380	7,575	—	—	—	... ... Udon Thani
28	462	8,367	131	1,885	29,913	20	65	600	Total Region 10
5	87	1,378	14	181	2,095	—	—	—	... ... Kalsin
7	90	1,631	11	108	1,315	4	7	80	... ... Nakhon Phanom
3	69	1,431	21	324	4,939	2	11	—	... ... Mahasarakham
6	89	1,745	27	325	5,137	3	21	41	... ... Roi-Et
8	121	2,170	58	949	10,427	11	26	470	... ... Ubonratch-Thani

TABLE 1 NUMBER OF SCHOOLS, TEACHERS AND

ประจ าท โ ร ง ร ะ บ

อนุบาล Kindergarten			ประช า น า ล ป. ก ั น Local (Lower)			ประช า น า ล ป. ป า ล า Local (Upper)			เทศบาล Municipal		
โรงเรียน Schools	ครู Teachers	นักเรียน Students	โรงเรียน Schools	ครู Teachers	นักเรียน Students	โรงเรียน Schools	ครู Teachers	นักเรียน Students	โรงเรียน Schools	ครู Teachers	นักเรียน Students
3	42	1,132	3,299	11,219	472,293	143	1,952	56,827	18	229	7,584
—	—	—	464	1,557	64,030	22	378	11,367	3	28	793
1	18	525	956	3,300	140,060	39	628	19,101	9	105	3,809
1	9	189	577	1,921	83,804	34	424	12,978	2	36	1,228
—	—	—	660	2,308	90,601	21	208	6,701	1	13	461
1	15	418	842	2,133	84,708	27	314	8,504	3	49	1,293
7	79	1,903	1,467	4,580	167,708	168	1,706	52,467	36	315	11,039
1	11	313	166	528	16,080	23	223	6,013	6	44	1,348
1	9	205	226	877	34,027	30	382	11,068	2	25	735
1	23	618	227	812	34,310	36	422	14,984	10	108	4,166
1	8	126	225	260	7,586	18	138	2,585	3	12	436
1	12	388	149	593	16,910	18	188	4,150	4	28	936
1	7	139	350	1,063	41,797	27	257	8,043	9	80	2,827
1	9	206	117	438	17,418	18	190	6,618	2	18	591

STUDENTS BY TYPE OF INSTITUTION AND BY CHANGWAD (Contd.)

Type of Institution									Changwad
มัธยมวิถีรัฐบาล Secondary			ราชภรษ์หลักศึกษาสามัญ Private (Regular)			ราชภรษ์หลักศึกษาพิเศษ Private (Special)			
โรงเรียน Schools	ครุ Teachers	นักเรียน Students	โรงเรียน Schools	ครุ Teachers	นักเรียน Students	โรงเรียน Schools	ครุ Teachers	นักเรียน Students	
34	589	10,487	94	1,461	26,665	12	33	375	Total Region 11
3	58	1,164	17	257	3,703	3	9	38	... ... Chayapum
13	260	4,367	36	637	13,622	5	14	222	... ... Nakhonratchasima
8	99	1,023	10	128	2,118	—	—	—	... ... Buriram
6	83	1,534	16	220	3,700	2	8	90	... ... Sisaket
4	89	1,499	15	219	3,432	2	2	25	... ... Surin
43	690	11,002	172	2,151	47,908	35	61	1,505	Total Region 12
4	82	1,168	10	142	3,672	1	3	135	... ... Chaiaburi
7	107	2,053	27	432	10,146	22	40	644	... ... Cha-Chaengsao
11	239	3,192	76	951	22,078	7	12	234	... ... Chonburi
2	37	499	6	34	644	1	2	87	... ... Trat
5	71	1,238	15	106	3,267	3	3	75	... ... Nakhonnayok
10	93	1,788	24	252	5,185	1	1	30	... ... Prachinburi
4	61	1,064	14	144	2,916	—	—	—	... ... Rayong

1/ Local (Upper) includes Elementary Demonstration Schools and Special Schools under Division of Special Education.

2/ There are 60 schools in Bangkok and Thonburi operating on the two-shift basis. Data presented includes teachers and pupils in the afternoon shift.

3/ Secondary—Includes Secondary Demonstration Schools.

TABLE 2 ENROLLMENTS BY TYPE OF INSTITUTION.

SEX AND GRADE

Type of Institution

ນັບຄົມວິທະນາຄູ Secondary		ຮວມທຸກປະເທດ Total all Types			Grade
ຊາຍ Male	ພິເນິດ Female	ຊາຍ Male	ພິເນິດ Female	ຮວມທຸກສອງເພດ Both Sexes	
91,570	67,580	2,500,080	2,270,450	4,870,430	Total All Grades
—	—	33,935	30,978	64,913	Total Kindergarten & Pre-Primary
—	—	15,745	13,837	29,582	... ... ... ... Kindergarten first grade
—	—	10,737	9,949	20,686	... ... ... ... Kindergarten second grade
—	—	7,453	7,192	14,645	... ... ... ... Pre-primary
—	—	2,117,710	1,943,160	4,060,870	Total Lower Elementary
—	—	675,384	610,098	1,285,482	... ... ... ... Prelom 1
—	—	566,416	516,667	1,083,083	... ... ... ... Prelom 2
—	—	475,048	439,782	914,830	... ... ... ... Prelom 3
—	—	400,862	376,613	777,475	... ... ... ... Prelom 4
—	—	260,143	178,849	438,992	Total Upper Elementary
—	—	105,605	74,817	180,422	... ... ... ... Prelom 5
—	—	85,558	58,687	144,245	... ... ... ... Prelom 6
—	—	60,980	45,345	114,325	... ... ... ... Prelom 7
80,892	56,051	150,826	104,118	263,944	Total Lower Secondary
27,487	18,966	57,748	36,709	94,537	... ... ... ... Maw Saw 1
28,149	19,876	53,485	34,884	88,369	... ... ... ... Maw Saw 2
25,256	18,309	48,593	32,445	81,038	... ... ... ... Maw Saw 3
10,684	10,609	25,966	22,354	48,320	Total Upper Secondary
4,964	3,413	12,096	7,701	20,697	... ... ... ... Maw Saw 4—Science
1,238	2,605	3,368	5,534	8,902	... ... ... ... Maw Saw 4—Arts
141	238	257	536	793	... ... ... ... Maw Saw 4—General
3,639	2,418	7,620	4,702	12,322	... ... ... ... Maw Saw 5—Science
654	1,771	1,662	3,675	5,337	... ... ... ... Maw Saw 5—Arts
50	101	63	206	269	... ... ... ... Maw Saw 5—General

1/ Local (Upper)—Includes Primary Demonstration Schools and Special Schools under Division of Special Education.

2/ Secondary—Includes Secondary Demonstration Schools.

TABLE 3 TEACHERS BY QUALIFICATION, SEX AND TYPE OF INSTITUTION

Chart 1. Number of Schools, Teachers and Students,
by Type of Institution, 1964.

Chart 2. Number of Students by Grade and Sex, 1964.

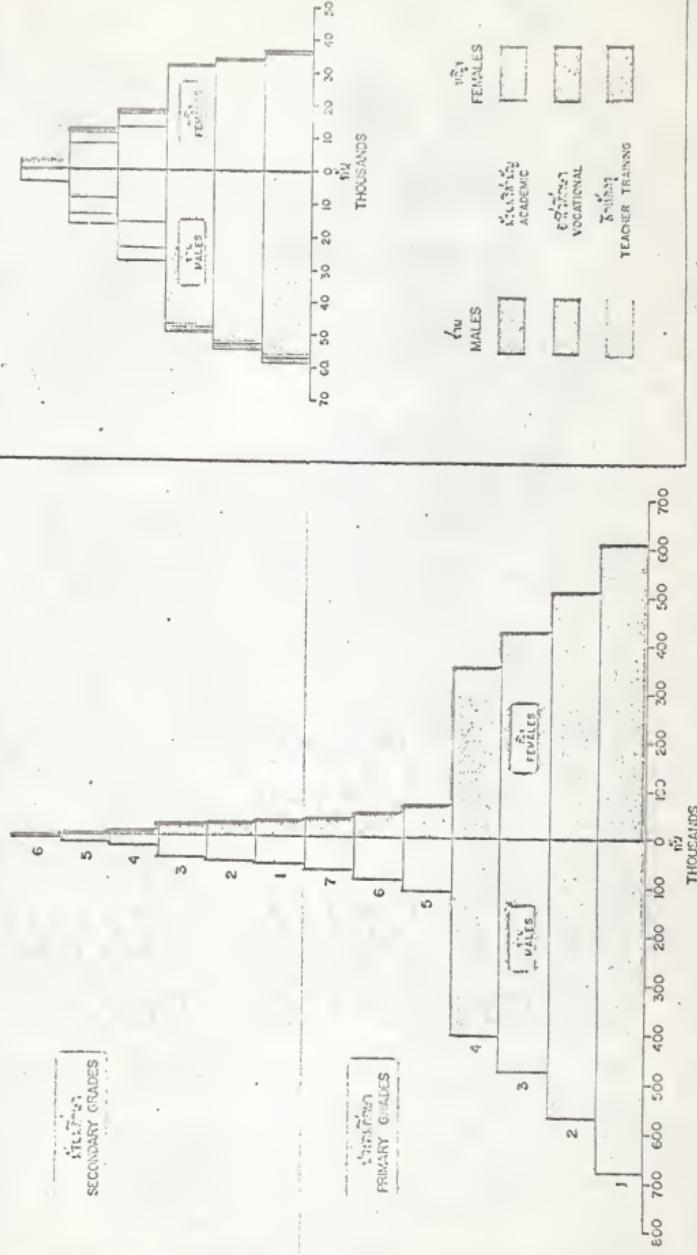
CHART I NUMBER OF SCHOOLS, TEACHERS AND STUDENTS, BY TYPE OF INSTITUTION, 1964

	ໄປສັນ INSTITUTIONS	ຜູ້ TEACHERS	ຝ່າຍືນ STUDENTS
	500	1000	50,000
ຄົນເປົດ KINDERGARTEN	1 50ໄປສັນ	1 620 ຄນ	1 13,983 ຄນ
ປະຈຳນາຄ ປະຈຳນັ້ນ LOWER LOCAL	22507 ໄປສັນ	78393 ຄນ	3,279,05 ຄນ
ປະຈຳນາ ປະຈຳນັ້ນປະ UPPER LOCAL	1641 ໄປສັນ	19,898 ຄນ	574,097 ຄນ
ມະນຸຍາ MUNICIPAL	455 ໄປສັນ	691 ຄນ	230,472 ຄນ
ທີ່ນະວິດຳທັນ SECONDARY	444 ໄປສັນ	9,301 ຄນ	159,336 ຄນ
ຮັກກໍາທັນ PRIVATE REGULAR	2230 ໄປສັນ	33,092 ຄນ	777,746 ຄນ
ຮັກກໍາທັນ PRIVATE SPECIAL	658 ໄປສັນ	3,928 ຄນ	65,490 ຄນ
ຮັກກໍາທັນ VOCATIONAL	201 ໄປສັນ	8,261 ຄນ	44,839 ຄນ

CHART. 2

NUMBER OF STUDENTS BY GRADE AND SEX, 1964

SECONDARY GRADES COMPARING STUDENTS IN
ACADEMIC VOCATIONAL AND TEACHER TRAINING STREAM



BUILDING MATERIALS

Local Building Materials

Wood. This is the common building material being used in Southeast Asia because there are many huge areas of evergreen forests. Woods are divided into three grades, depending on their qualities.

Teak has the highest quality among the preferred kinds of woods. It has a long grain and the texture is smooth and fine. It very rarely shrinks after it has been seasoned. This is one of the factors for its being preferred to other distinguished woods. At present, though, teak has been cut down rapidly; the supply is not meeting market demands. Its great scarcity affects the price; in the last few years prices are more than doubled. For those reasons, instead of being used for construction work, it is now being used only for furniture and finishing work.

Redwood is graded as Grade B because of its qualities. It also has a long beautiful grain and is a little red in color. It is popular to use for both furniture and construction. It has little tendency to shrink after having been dried set. It is used for interior construction members such as beams, floors, and ceilings.

Kong-Kang, Maka, and Ta-Kien woods are also graded as Grade B. They are a little white in their texture and have short grains. They are used only for structured parts such as beams and posts because the wood has a rough texture and

shrinks more than teak.

Yang and Tabak woods are in Grade C which is the lowest quality among the woods used in Thailand. They shrink very often and as much as one-half to one inch on each side. They are used only for temporary building and sometimes as inside members of a wooden wall. They are easily destroyed by termites and moisture. For this reason, before they are used in construction, tar or d.p.c. (damp proof course) must be applied. They are more popular to use as the wooden piles because they are cheap and because, being located in the water, they are more durable than in air. Mean Sea Level in Thailand is three to four feet in average length and wooden piles are widely used.

Concrete. This has become the main building material in Thailand since 1960, when the cement factories were established. At present, there are more than three large cement factories in the country. The cement industry has become one of the top ten industries in Thailand.

In spite of having the steel rod industry established a few years ago, the steel rods are still in great demand on the market. Thailand imports a large number of steel rods from Belgium and Japan. The reinforced concrete, because of new techniques and methods in production, is widely popular. For instance, pre-cast concrete, prefabricated concrete, pre-stressed concrete, shell concrete, floating concrete, concrete blocks, reinforced concrete pile, and long span prestressed concrete beams are widely used in construction. These new

forms of concrete have been recently used in construction in about the past ten years.

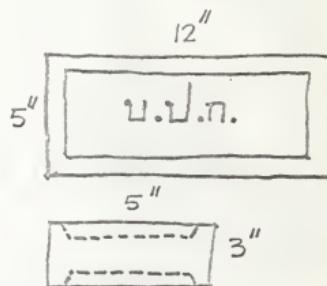
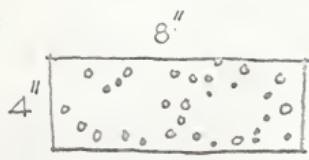
Bricks. Bricks have been used for a thousand years. The standard size is small: 10" long, 5" wide, and 1½ - 2" thick. Bricks are made from different kinds of soil and clay combined with a chemical solution and are baked. There are two kinds of bricks in Thailand:

1. B.B.T. (Bang-Boa-Tong) are the initials of the place where this kind of bricks is made. B.B.T. are the best in quality among the used bricks, because they can stand a high pressure. They have a beautiful color and a fine texture. The principal use is for decorative exterior walls.

2. Morn-Bricks are made from low quality soil mixed with clay by poor laymen handcraft. They cannot stand much pressure because they are made to be very light and have many perforations. They are used for light construction work such as fences, walking paths, and one-story walls which are covered with plaster.

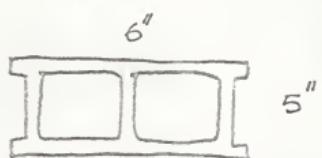
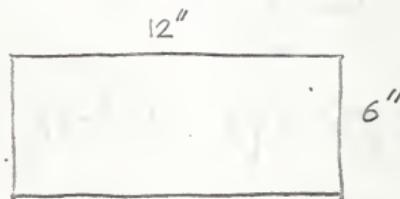
Concrete Blocks. These are a mixture of cement and sand. They are widely used in construction. They are designed to stand pressure, are light in weight, and easy to join together with cement mortar. Their size is a little larger than that of clay bricks because they have hollows to reduce their weight.

Terra-cotta and Glazed Tile. These are manufactured in many kinds and forms in Thailand. They have been used for nearly 400 years. Glazing has been applied not only for building materials but also for the use in manufacturing furniture.



MORN BRICK

B.B.T. BRICK



CONCRETE BLOCK

Colorful glazed tile is used all over the country and has traditional colors. It has been used to cover the temple roofs and the roofs of residential buildings. Presently, since the new modern materials were introduced, glaze tile is also being used for decorative walls and floors.

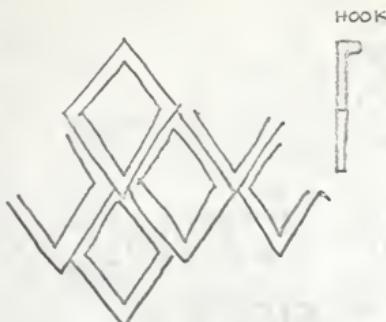
Terra-cotta tiles are popularly used to cover floors. Most of them are locally made; each province has her own style in manufacturing terra-cotta tiles in different shapes, various materials, and colors.

Roofing Material. There was an evolution in roofing material about 15 years ago. New materials were introduced on the market. "Continuous Waves Cement Tile" and "Double Waves Cement Tile" are two building materials produced by one cement factory. They are made in 3x6 feet or 4x8 feet sizes and have a design of small waves running through their length. They are about 1/8 inch in thickness. These new materials which are a mixture of cement and asbestos are lighter than the old fashioned glazed tiles. The structural members and the weight of the roof have also been reduced. But the old fashioned rubber, glazed and terra-cotta tiles are still used, especially for roofs of temples and of old Thai traditional buildings.

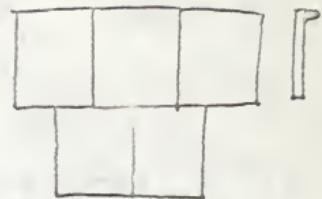
Because of the small size (8"x12") of the local glazed tiles, they have to be overlapped on each other and hence have many cracks between them. This situation endangered the loaded roof structure and caused the use of the high pitch roof to become the architectural style.

Glass. The Glass Industry has been recently established

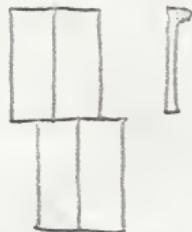
○ OLD STYLE ROOF TILES



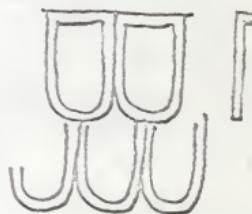
FISH TAIL GLAZED TILE



SQUARE TERRA-COTTA TILE

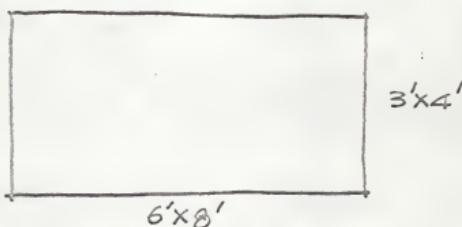


RECTANGULAR TERRA-COTTA TILE



ROUND TAIL GLAZED TILE

○ CEMENT ROOF TILES



CONTINUOUS WAVES CEMENT TILE



DOUBLE WAVES CEMENT TILE

in Thailand by the help of a Japan Glass Industry Company. Because of a lack of skilled laymen, the quality of glass has been far below standard. Presently, glass is listed as the fourth biggest building material used in construction in Thailand. Most of the glass is imported from Japan, Belgium, and the U. S. A. Anti-sun glass and tinted and colored glass are widely used.

Imported Materials

Rubber Tile. The quality of local rubber tiles made in Thailand has not reached an acceptable standard. Most of the rubber tiles used in construction are imported from Japan, Germany, and the U. S. A.

Paints. The modern Thai architect tries to avoid use of paint. Because of the necessity for maintenance and repairing, and also because of the lack of endurance of paint, painting of buildings is ignored. Locally-made paints are in good demand, but the paints lack quality. Most of the paints are imported from the U. S. A., Germany, and Japan. Polishing oil, wood oil, or lacquer are produced in the country. They are of good quality and are low in price.

Building Hardwares and Sanitary Equipment. The better quality building hardwares are imported from Belgium, England, and Japan. The locally-made hardwares are used in temporary construction because of their low price. The local merchants attempt to copy the products in order to reduce the importation tax and shipping expenses, but the quality is still far below

that of standard hardware.

Production of sanitary equipment has become a big business in Thailand. Thailand imports as many as 0.4 to 1 million dollars worth of such equipment every year from the U. S. A., Belgium, and Japan. Old style glazed terra-cotta sanitary equipment is still used in far away provinces, but this equipment is not hygenic and does not last long.

Aluminum Products. These Aluminum products are imported mostly from Japan, Taiwan, and the U. S. A. The aluminum door and window frames, sun louvers, and grills are actively in fashion in modern Thai architecture.

Steel Rods. As was mentioned before, the construction in Thailand is aggressive in using reinforced concrete. New methods and techniques of using reinforced concrete are being developed. High tension steel rods and special quality steel rods are widely used in new construction. These steel rods are imported from Japan, Taiwan, at a cost of as much as 5 to 7 million dollars every year. Even though there have been big steel rod factories in the northern part of Thailand during the past few years, enough steel rods are still not produced to fulfill the demand of the market.

THE DESIGN FOR A SCHOOL, BANG-AUO COMMUNITY,
BANGKOK, THAILAND

The Trends of School Designing

The objective of this project is to design a school serving a small industrial community 12 miles southeast of Bangkok. This school design will be prepared to meet the needs of the near future (15 years). This community is named Bang-Auo community; it is in Bangkapi district, Bangkok.

By the Land-Use Act of 1964, announced by the government, Bang-Auo became an industrial area. By the end of 1966, there were two heavy industries--an Oil factory and Plywood; Glass and Battery factories are two medium-sized industries; and Plastic and Hardware are light industries also located in this area.

According to the Census Tracts 1966, there will be 1,000 blue collar families and 200 white collar families by the year 1975. This number will increase by 35% of blue collars and 5% of white collars by the year 1975 (census, 1964). According to this survey, low income groups will have a tendency to stay in this area and the higher income will tend to move out. By the year 1975, according to the forecast, there will probably be:

- 1,750 worker families
- 200 medium income families
- 120 high income families in this community
(Census, 1965).

There are two private schools and one community school in the area. This project aims to provide a school to carry the

overflow enrollment of the future. This school will be designed for:

- | | |
|--------------------------|------------------|
| 1. Kindergarten | 80 - 100 pupils |
| 2. Elementary (5 grades) | 300 - 350 pupils |
| 3. Secondary (7 grades) | 560 - 600 pupils |

with the possibility of a 25% expansion in 1975.

Economic Trends. The main objective of the educational development is to create a trained labor force for the country. This project is designing a school for Bang-Auo community, which is to provide education for a small community, a suburb of Bangkok. Children who live in the suburb of Bangkok will usually have to travel 10 miles to attend more efficient schools in the urbanized area in the city, unless qualified schools in the suburbs are able to handle the enrollments. Thousands of children travel by bus, taking one to one and one-half hours every day and costing 1.00 to 2.50 β (the average income is 960 β a family) for transportation. This present procedure causes heavy traffic, waste of time and money, and produces conditions which affect the economy of the country.

The aim of this project is to serve the students within the limit of a three-fourths mile distance. The school will be designed to handle the growth of Bang-Auo community for the next 15 years. All the children in the community will be within walking distance (3/4 mile in radius) of the school. The heavy traffic on both Sukumvit Highway and Rama IV Avenue will be reduced during rush hours. The travel time and gas

consumption during the peak hour in the morning and evening will be shortened.

Social Trends. Bang-Auo Community School is located in an industrial zone. Seventy-five per cent of the people are blue collar workers, classified in the lower class, with an income of 960 β (\$48) per month (20 β are equivalent to one dollar), and 20% are in the middle class with an average income of 2,500 β (\$125) per month. These blue collar workers live in apartments located around the factories.

Because of the Educational Development Plan for 1964, the government has planned to put compulsory education into force in every community in the country. Schools for a community are widely introduced in faraway provinces and are financed by the government. The community school at Bang-Auo is one of the schools under this program designed to help the children of blue collar families who cannot afford to attend private schools or to travel ten miles every day in order to get a better education.

Political Trends. Sukumvit Highway, feeding southeast provinces to the capital of Thailand, becomes more and more important from the political point of view, as the result of the United States Air Base and Navy Base located near the southeast border of Bangkok. Communities and provinces southeast of Thailand will become military spots and people will face the problem of communicating with people of different languages. Better education for people is one of the alternatives not

only to solve the problem but also to raise the standard of living.

Another dangerous situation that the Thai government presently faces is the crisis of communist propaganda along her border. Numbers of people at the border are low-income class and illiterate, which is the weak point to be propagated by communism. To educate people is one of the main approaches to establish a successful democracy and to overcome communism.

Program of Bang-Auo Community School, Bangkok

Location. This school is to be located twelve miles southeast of Bangkok. The land is flat and about one-half mile square. The Sukumvit Highway and Rama IV Avenue will feed this area. The site is about one-half mile from the Chaopraya River which is the main river in Thailand. This area is an industrial area with the majority of blue collar workers settled around the factories. The only governmental school which offers higher education in the level above the compulsory school is located about three miles away. Besides the industrial families, there are about 150 agricultural families which will have a tendency to move away in the near future.

The site is located between Sukumvit Highway on the east, Rama IV Avenue on the west, Pongvat-Anurson Street on the north and Soi 68 on the south. There is a small canal running through this area which feeds all the rice fields. Fruits are also grown in this area. (See maps on pages 63, 64, 65.)

N.

TO NORTH
(AIR PORT)

63



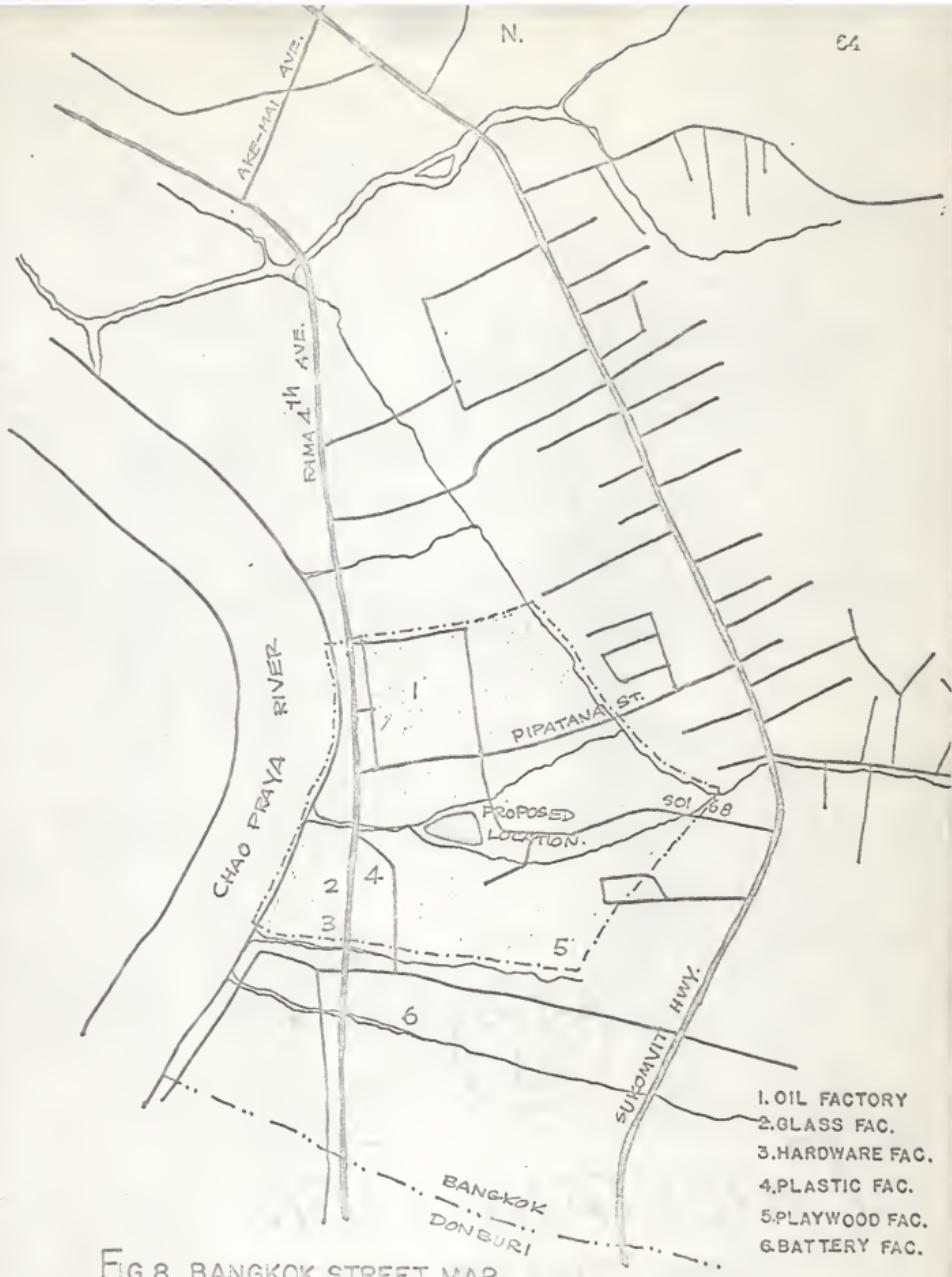




FIG. 9 BANGKOK LAND-USE MAP

1/2 MILE

○ RESIDENTIAL
● INDUSTRIAL

The Requirements of the School. This project will provide for education for children starting from Kindergarten to Secondary School. The new systems and techniques of teaching have been introduced, such as.

Kindergarten:	Playing system
Elementary:	Academic system
	Vocational system (no class method)
Secondary:	Academic system
	Vocational system
	Group teaching system

These levels of education will be established in this school and will have the same administrator. The school will be designed to be a complex for the levels of education. Each particular area will be designed to be isolated in its own building but joined with the common areas of administration, auditorium, gymnasium, and kitchen.

Kindergarten: Includes three grades--pre-primary, first and second year of Kindergarten, which consists of:

- pre-primary
- kindergarten I
- kindergarten II
- nursery quarter
- bathrooms
- teacher's quarters
- nurses or teacher assistants
- storage
- observation room

Elementary: Grade 1 - 5

- main concourse
- bathrooms for grade 1 to 4
- bathrooms for elementary children
- teachers' quarters
- classrooms
- indoor playing area
- outdoor playing area
- common space
- outdoor garden

Secondary: Grade 6 - 12

- main concourse
- teachers' quarters
- rest rooms
- common space
- general classrooms
- special classrooms
 - chemistry lab.
 - biology lab.
 - language lab.
 - home economic lab.
 - physics lab.
 - arts and crafts lab.
 - ceramics lab.
 - audio-visual
 - electronic

- seminar rooms
- individual study rooms
- indoor and outdoor playground

Administration:

- principal's office
- vice-principal's office
- main office
- guidance offices
- storage
- first-aid room
- meeting rooms
- rest rooms
- teachers' office
- waiting area

Services:

- kitchen
 - main storage
 - dietician's office
 - mechanical room
 - changing rooms
 - frozen storages
 - baking area
 - preparing area
 - cooking area
 - pantry
 - dish washing room
 - linen room

- library
- outdoor space
- swimming pool
- cafeteria
- outdoor garden
- botanical garden
- auditorium
- musical, rehearsal room
- changing rooms for field tracks
- parking spaces
- picnic and recreation area

The Design Concept

"Bang-Auo Community School : Bangkok, Thailand"

Relationship of the School's Complex. The objective of this school is to serve the small community in which there are children of all ages. In order to keep children in the community and to cut down travel time, the school should provide classes from Kindergarten to Secondary School; furthermore, it should be located in the center of the community.

Because of the above reasons, Bang-Auo Community School is designed to consist of:

Kindergarten

Elementary School

Secondary School

In order to group them together, common space is provided in the center. All facilities such as auditorium, gymnasium, kitchen, and administration offices are located around a common space. It also serves as the open space of the complex.

Study Location. Bang-Auo Community School is situated on flat land beside the river. The M.S.L. (Mean Sea Level) is a little high in that area, so it is necessary to grade the whole site and raise the school on a high platform or build it on stilts.

As the wind direction varies from southeast to southwest, the school is designed to be open to the south to profit from natural conditions. Air-conditioning is too expensive for a school building. Only some of the principal buildings such as the auditorium and the administration building are to have it installed. (According to the Educational Development Acts 1964, the unnecessary expenditures for the government schools are limited.)

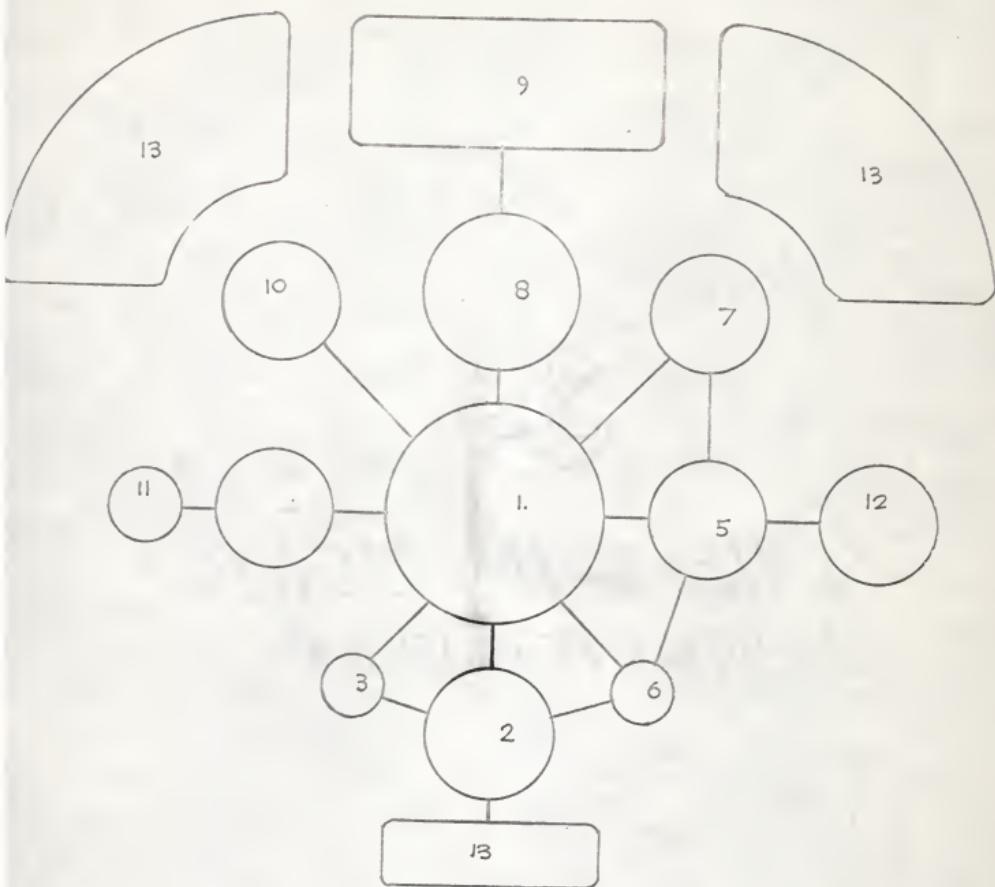
The drainage system is carefully designed to enable the water to drain away as fast as possible. Rain drainage is controlled by drainage pipes under the ground and is drained to canals. Sewage disposal is dumped into septic tanks which can be removed when full.

Sun control is one of the main problems. Long cantilever construction must be considered in creating shadows. Sun screens and sun louvers are widely used in this design.

Materials. Local materials are the first choice in developing this design because they will:

FIG. 10 THE DIAGRAM OF THE SCHOOL RELATIONSHIPS.

71



- 1. Common space.
- 2. Administration.
- 3. Kindergarten.
- 4. Elementary sch.
- 5. High school.
- 6. Kitchen.
- 7. Secondary sch.
- 8. Auditorium.
- 9. Out-door tracks.
- 10. Swimming pool.
- 11. Botanical garden.
- 12. Library.
- 13. Parking areas.

- keep the capital price low.
- help local industries.
- serve the concept of "Organic" or of design cooperating with nature.

Structure. Reinforced concrete will be the main material used in the construction. Space frame and steel frame will be used in long roof spans in order that open space will be broken up with fewer columns.

Auditorium structure is hyperbolic paraboloid reinforced concrete, mounted on the two supports, to avoid any obstruction of the view when it serves as an outdoor stadium (see p. 75).

Auditorium (Dwg. No. 10 in Presentation). The auditorium is one of the main buildings in the group. This parabolic shaped auditorium is divided into three parts by movable walls that will be used as two big lecture rooms and one drama house. The full capacity is for an audience of 1,015 people.

This auditorium is designed to be used for multipurposes of: two lecture rooms, one drama house, movie theater, outdoor stadium, and concert.

The movable wall is used to create flexibility. When used as an outdoor stadium, the walls adjacent to the stage of the auditorium are designed to be moved down into slots in the floor.

Seating area is on the sloped floor, which is elevated for the purposes of good sight and sound wave reception. The side walls are broken into sections to create the best sound reflection. The hard surfaced ceiling is concaved hyperbolic

concrete structure which will reflect the sound to the back of the auditorium. The movable side walls are shaped to diffuse and to reflect the sound to different spots, and also to eliminate the possibility of a parallel wall which might create the echo sound (see Dwg. 10). The wooden-slat panels are mounted at the back of the auditorium to control the sound absorption of the room.

Acoustics are chosen and designed to suit the multi-used auditorium. The foremost considerations to be concerned with the problems of acoustical design of the auditorium are:

- to eliminate the unwanted sound.
- to eliminate the echo sound.
- to gain the best audibility of all sounds of all performances.
- to gain the optimum of reverberation time.

According to Knudson,¹ the effectiveness of this auditorium is about 1.39 seconds for 512 cycles per sec. in reverberation time and 1.05 sec. for 512 cycles per sec. for the music rehearsal room (see acoustical calculation).

The structure is concrete hyperbolic paraboloid, mounted on the two supports.

Ventilating and air-conditioning equipment is mounted on the roof to reduce the air-conditioning ducts.

¹Knudson - Author of "Acoustical Designing for Architecture," 1950.

Lighting is controlled by two luminous elliptical shaped ceilings. Spotlights and stage lights are hidden behind the ceilings.

Music Rehearsal Room (Dwg. 10 in Presentation). The music rehearsal room is located on the ground floor and houses 60 rehearsal musicians. Storage, ticket room, rest rooms, mechanical room, and locker rooms surround this area.

Acoustic Study

The general approach of the acoustical design in this project is based on the following considerations:

Locate the site away from the intruding noises around the area. In order to gain this advantage, the auditorium is located on the west of the school site, separated from other buildings and away from the streets (see Dwg. No. 1).

Limit the size of the auditorium. The auditorium in this project is designed to accommodate an audience of 1,015.

Design the shape of the auditorium so that the plentiful flow of direct and beneficially reflected sound will reach all auditors and so that the audience area will be free from echoes, flutters, and sound foci (see Dwg. No. 10).

Provide the optimum reverberation in all parts of the auditorium throughout the range of frequencies.

Shaping the Auditorium. The shape of the auditorium is

elliptical, with about 201,000 cubic feet. The structure is hyperbolic paraboloid reinforced concrete which creates the convex ceiling. The walls are broken down into many sections to reflect the sound to all parts of the room (see shaping auditorium, Dwg. No. 10). The back wall is solid concrete with convex wooden-slat panels to control the absorption unit in the room.

The shape of the auditorium is carefully designed to eliminate:

Flutter. By shaping the room as an elliptical shape and breaking the wall into sections, parallel walls will be neglected and flutter sound will be under control.

Echo and Blur. It occurs when the difference of reflected sound and the original sound is more than 65 feet or about 0.06 sec. apart. And even when the difference is somewhat less than 65 feet but greater than 50 feet, the delayed reflection tends to blur the direct sound. The delayed reflections are most detrimental when they are focused by a highly reflective concave surface.

In order to solve this problem, the path of the reflecting sounds and the direct sound is checked (see Dwg. No. 10) and allowed the difference of less than 50 feet. In the meantime, absorption materials such as Wainscot wooden-slat panels are mounted around the back wall for absorption and diffusion of the sound, thereby providing conditions that will give us the proper reverberation time and eliminate blur.

Sound Foci. This is the focusing of concave surfaces. The sound may focus on any spot in the concave area, or it may

focus at the speaker when he stations at the center of the circle. In case the reflected sound exceeds the direct sound by 65 feet or more, a prominent echo will be heard, and these phenomena will create a serious sound illusion.

To avoid these problems and provide good acoustics, the walls of the elliptical shaped auditorium are broken down into flat surfaces with dimensional characteristics similar to the long wave lengths. The concave surface at the back is convexed by the projection room wall and covered with wooden slat panels.

Dead Spots. Owing to the focusing effect of concave surfaces, rooms having concave surfaces suffer from localized concentrations of the sound. These excessive concentrations are formed at the expense of deficiencies of reflected sound at other localities in the room. Another type of "dead spot" occurs when the condensation from one wave (such as the direct sound wave) unites with the rarefaction of another (as the reflected wave). Interference of this type is not so deleterious to the acoustics of a room as is popularly supposed.

In the design of the auditorium, the solid convex surface of the ceiling works as a diffusing panel, eliminates the dead spots, and diffuses sound to every part of the room.

Room Resonance, Normal Modes. It is the voice actuating the normal modes of vibration of the room. Actually, the object is vibrated by the sound at one of its resonant frequencies. The closer the frequency of the existing noise to a resonant frequency of the object, the greater will be the response of the resonant vibration. In this case, if the

source of sound that has the same level at all frequencies is placed into the room, the sound pressure at the same distance will no longer be constant with each frequency; instead, it will be much higher at some frequencies than at others. This phenomenon is called "transmission-frequency characteristics."¹

To solve the problem, the amount of absorptive materials in a room must be increased to smooth out its transmission-frequency characteristics. The peak would be broadened and lowered so that it is close to the mean.

Reverberation Time. Reverberation time is the length of time it takes to drop to one-millionth of its initial intensity (60 db) after the source stops.

The term optimum reverberation time includes not only the reverberation time vs. frequency characteristic throughout the audible range of frequencies, but also the optimum nature of growth and decay of sound in the room and the optimum ratio of reverberant to direct sound reaching auditors.

Certain aspects of speech and music, and of hearing, indicate that the reverberation time at low frequencies may be longer than the optimum time at 512 cycles.² The most favorable characteristic for a room is represented by a chart,³ which

¹Knudson, "Acoustical Designing for Architecture," 1950.

²For a discussion of criteria for determining the most favorable reverberation time vs. frequency for speech rooms and for music room--Knudson, "Architectural Acoustics, 1932, pp. 382-414.

³Knudson, "Acoustical Designing in Architecture," 1950, pp. 194-195.

gives the optimum reverberation time as a function of frequency throughout the relevant audible-frequency range; for most rooms that are used for both speech and music, it is sufficient to specify the frequency range from 128 to 2048 cycles.

In order to obtain the optimum acoustical effect in the auditorium, the suitable reverberation time must be selected proportional to the volume, absorption units of surfaced materials, and the function of the auditorium.

As recommended by the Acoustical Materials Association, the following formula is used to calculate the reverberation time:

$$T \text{ (in sec.)} = \frac{0.49 V}{S \left(-2.3 \log_{10} \left(1 - \frac{1}{\bar{x}} \right) \right)}$$

According to the formula, the reverberation time mainly deals with the volume (V) and absorption units of material surfaces (S).

As mentioned before, this auditorium is designed for multipurpose uses. The reverberation time is designed for music, movie, concert, and speech in the same room. According to Knudson,¹ the suitable reverberation time for auditorium and rehearsal room are 1.39 and 1.05 sec. for 512 cycles per sec., respectively. The calculation is shown in the following pages.

$$^* \bar{x} = \bar{\alpha} \text{ (Alpha)}$$

¹Knudson, "Acoustical Designing for Architecture," 1950.

AUDITORIUM ACOUSTICAL DESIGN

	sq. metres.	sq. ft.
1. Floor	724.5	7,389.9
2. Wall	824	8,404.8
3. Ceiling	715.5	7,298.1
4. Opening	34	248.8
5. Surfacing (1+2+3+4)		23,439.6
6. Volume	6,158.3	201,374.8
7. V/person (105p.)		251.7/p.
8. 72° F, 50% humidity.		
<u>Required Absorption</u>		
9. Optimum Reverberation Time	128	512
	2.00	1.39
10. T_{60}	$= \frac{0.19 V}{S(-2.3 \log_{10}(1-x))}$	204.4
11. $-2.3 \log_{10}(1-x)$	$\cdot 210^5$	•3026
12.	$\cdot 19$	•261
13. Total sq. ft. of absorption required = S	$4,453.5$	6117.7

Absorption by Surfaces

		area/ sq. ft.	coef.	units	coef.	units	coef.	units	2048
<u>Floor</u>									
14. Lined carpet Cardinal on con. 7/16"	1,847	.15	277	.35	616.5	.6	1108.2		
15. Upholstered chairs (1/3)	266p.	2.5	665	3.2	815.2	3.5	921.		
16. Auditors in upholstered chairs (2/3)	534p.	3.2	1132	3.8	2029	4.5	2403		
<u>Ceiling</u>									
17. Plaster sand finish on con.	7298.1	.01	72.9	.02	145.9	.01 ₄	291.9		
<u>Air</u>									
18. Air 75% relative humidity	201,374	—	—	—	—	—	.0025	50.3	
<u>Door</u>									
19. Wooden doors	347	1.0	34.7	.05	17.4	.01 ₄	134.6		
<u>Wall</u>									
20. Plaster on con. wall	3362	.01	33.6	.02	67.2	.01 ₄	134.6		
21. Movable wall	504 _{2.8}	.18	907.7	.04	201.7	.02	100.8		
22. Plywood wainscot (8' high)	1344	.11	147.8	.12	161.3	.10	134.4		
<u>TOTAL Abs. AREA</u>			3270.7		4054.2		5167.2		

Absorption by surfaces (Cont.)

Absorption unit.	area/ sq. ft.	128	512	2048
	coef.	units	coef.	units
23. Added abs. req'd.		1182.8	2063.5	950.5
24. Req'd. acoustical mat; (Vivacor Inc., 6700-18)	.30	(.31-.01) 3942.7	.98 2105.5	(.84-.04) 969.9
25. Ave. x coef.	2339.3	.30	701.8 .98	2292.5 .8
26. T _u ML ABS.			3972.5	6346.7 7038.6
<hr/>				
27. $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{S}{S} = \bar{x}$		.169	.270	.300
28. $-2 \cdot 3 \log_{10}(1 - \bar{x})$		.186	.314	.356
29. T ₆₀		2.27	1.37	1.20
30. Error in sec. (off $\pm 10\%$)		+ .27	-.02	-.19

MUSIC REHEARSAL ROOM
1713.6 sq. ft.

1713.6 sq. ft.

	sq. meters	sq. ft.
1. Floor area	168	1,713.6
2. Wall	756	7,711.2
3. Ceiling	168	1,713.6
4. Opening	42	428.4
5. Surfacing (1+2+3+4)	1,134	11,566.8
6. Volume	1,176	38,455.2
7. V/k (60 persons)	19.7	200.9/p
<u>Per cent Absorption</u>		
9. Room Reverb. time	1.38	1.05
10.	160	$\frac{0.40}{S(2.3)^{10}(1-\bar{x})} (1-\bar{x})$
11. $-2.3 \log_{10}(1-\bar{x})$	.119	.1551
12.	.112	.145
13. Total sq. ft. units of Absorption required = S	1285.4	1677
		1677

Absorption by Surfaces

Absorption mat.	area/ sq. ft.	128		512		2048	
		coef.	units	coef.	units	coef.	units
<u>Floor</u>							
14. Wooden floor	657	.15	98.5	.10	65.7	.06	39.4
15. Upholstered chairs with 60 musicians	60p.	3.2	192	3.8	228	4.5	260
<u>Ceiling</u>							
16. Plaster sand finish on metal lath	963.6	.15	144.5	.06	57.7	.04	38.5
<u>Doors</u>							
17. Wooden doors	428.4	1.0	42.8	.05	21.4	.04	17.1
18. Plaster on masonry	4855.6	.08	388.4	.11	534	.13	631.2
TOTAL ABS. AREA			866.2		906.8		1007.2
<u>19. Added abs. req'd.</u>							
20. Req'd. acoustical mat. (Tracor Inc., 6700-18)		(.31-.01) .3	1397.5	(1-.02) .98	786	(.84-.04) .8	837.2
21. Ave. x coef.	1007	.3	302.1	.98	986.9	.8	809.6
TOTAL ABS.			1168.3		1893.7		1812.8

Check

		128	512	2048
22.	$\frac{\text{Vocal S}}{S} = \bar{x}$	.100	.163	.156
23.	$-2.3 \log_{10}(1-\bar{x})$	.105	.176	.166
24.	T_{60}	1.57	.94	1.00
25.	\bar{x} in sec. (off \pm 10%)	.18	.11	.05

Library (Dwg. No. 8). The library is located on the south of the school site. There are two stories of reading areas with natural ventilation. Five-storied stacks are designed in the middle of the area. Humidity and temperature are controlled by a central air-conditioning unit on the roof.

Designing Classrooms (Drg. No. 8). New systems of teaching have been introduced into modern education in Thailand. The designing of flexible classrooms, divisible lecture rooms, and no-classroom system must be considered to enable a school to be of maximum service in the future. The divisible auditorium is designed to maximize the usage of the area. Movable walls and movable furniture will be profitable.

Air-Conditioning and Lighting. According to the Education Act, 1964, the central unit air-conditioning is designed for the auditorium and the library stacks, and is mounted on the roof (see Dwg. No. 8, 10). Small unit air-conditioning is suggested for administrative areas.

Artificial lighting is recommended. Thirty to 75 foot-candles per square foot is suggested for classrooms and lecture rooms. Ten to 35 foot-candles is for auditorium, service areas, and hallway.

Design Concept. The design of Bang-Auo Community School is: organic in regard to the location and the environment, gives the impression of being a good architecture, fully serves the school functions, blends functional Thai architecture with modern Thai architecture, and makes use of nature as much as possible.

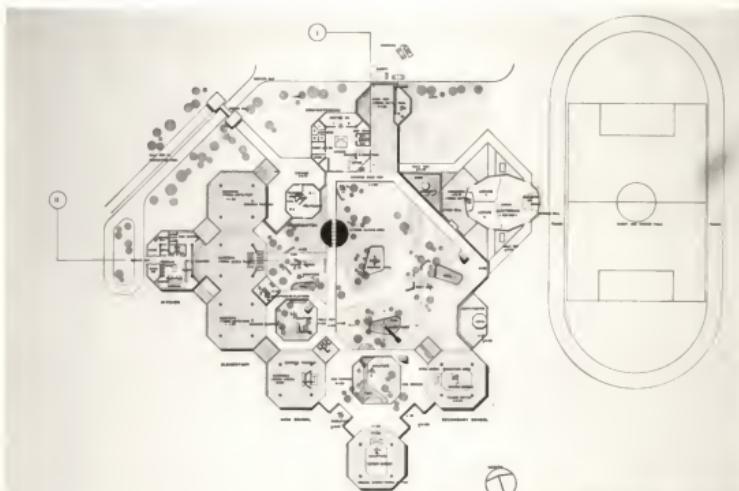
PRESENTATIONS



200

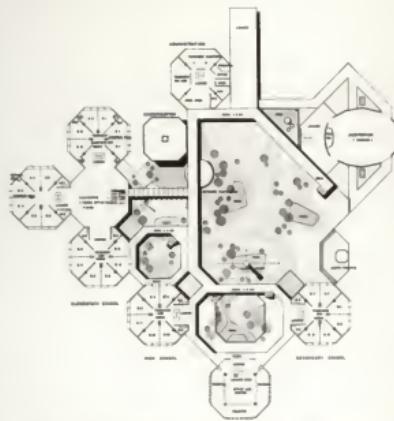
SITE PLAN 1:1000

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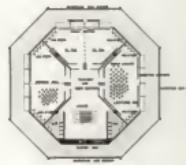
GENERAL PLAN 1:1000

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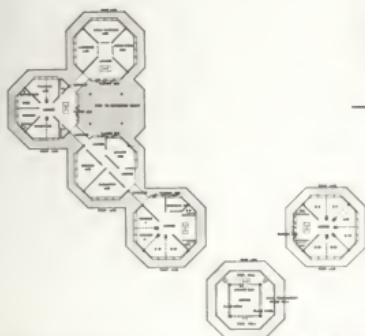


FIRST FLOOR PLAN 1:1000

COLLEGE OF ARCHITECTURE AND DESIGN	
3	LIBRARY
10	STUDY ROOMS

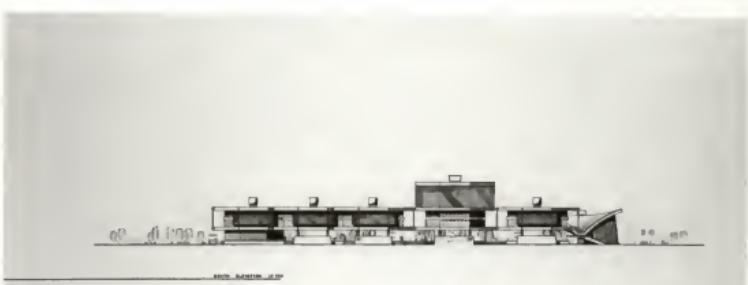
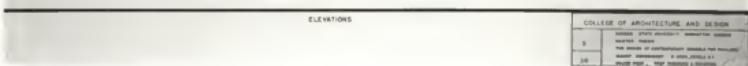
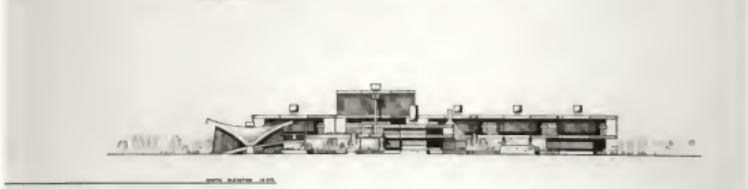


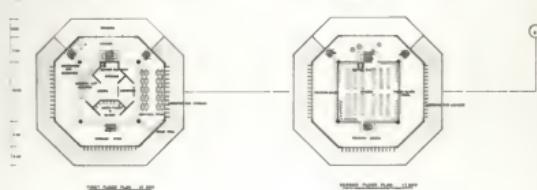
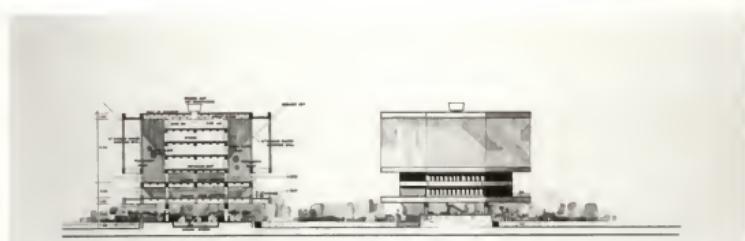
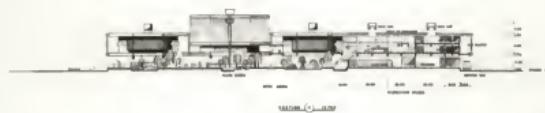
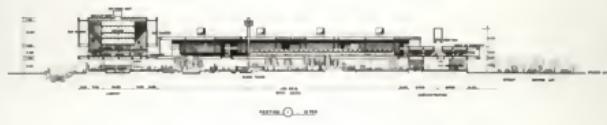
FIRST FLOOR PLAN OF TYPICAL CLASSROOM 1:100

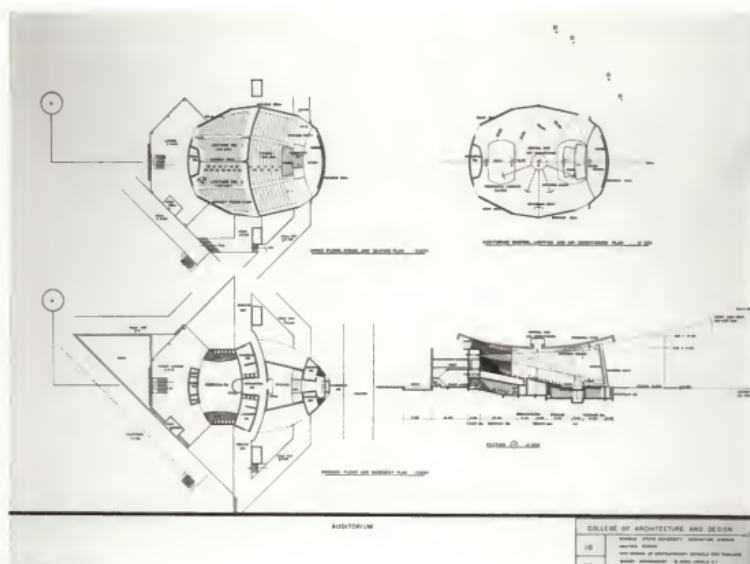
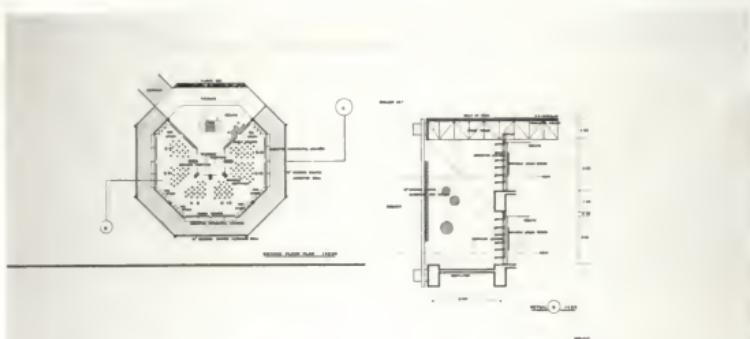


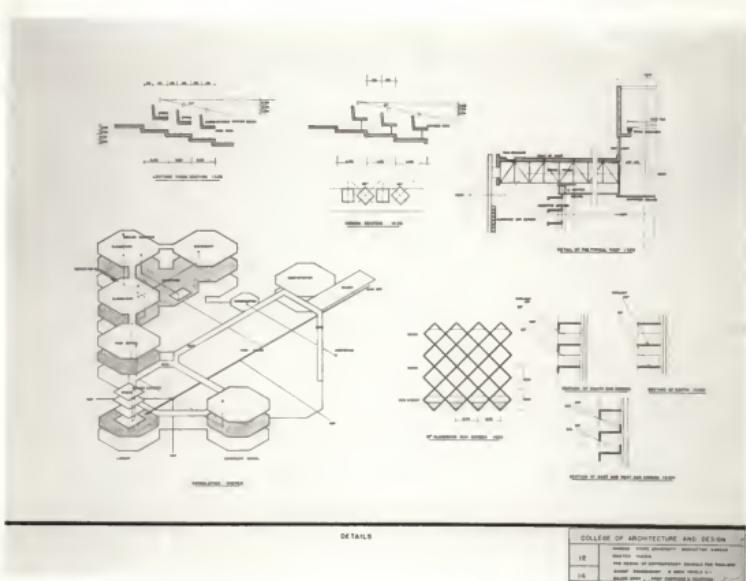
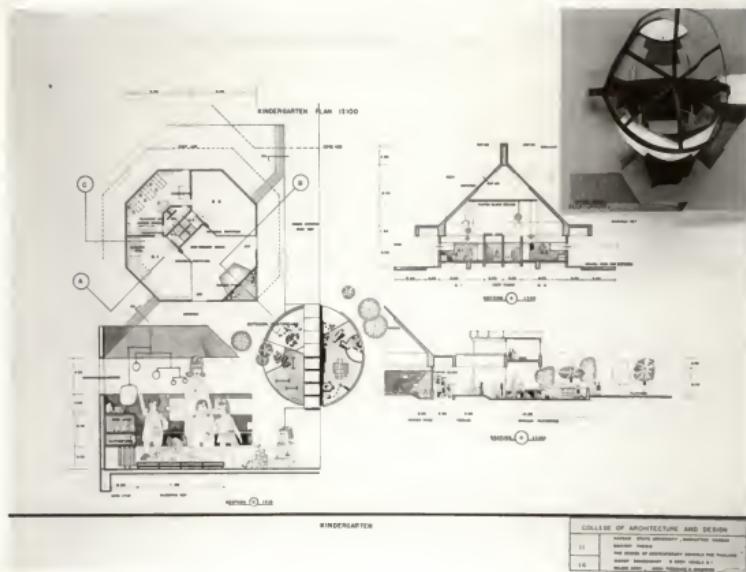
SECOND FLOOR PLAN AND FIRST FLOOR PLAN OF TYPICAL CLASSROOM

COLLEGE OF ARCHITECTURE AND DESIGN	
4	LIBRARY
14	STUDY ROOMS







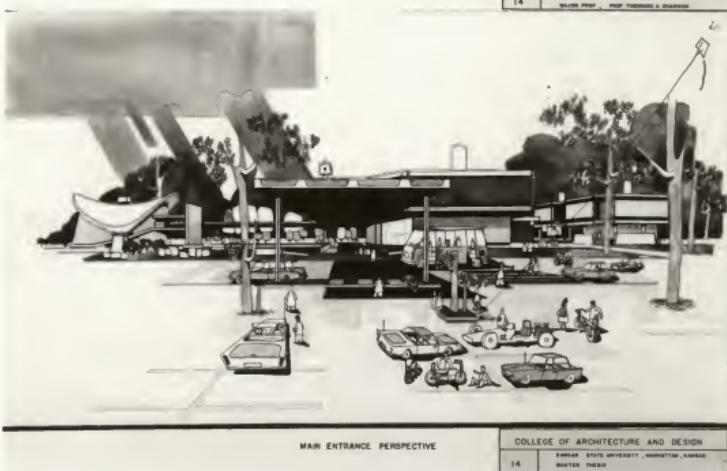




BIRD EYES' VIEW PERSPECTIVE

COLLEGE OF ARCHITECTURE AND DESIGN

KANSAS STATE UNIVERSITY, MANHATTAN, KANSAS
MASTER THESIS
THE DESIGN OF MODERNIZING SCHOOLS FOR THAILAND
SAJEEW PANDIT
SILVER PRIZE - PROF. THOMAS J. DRAKE



MAIN ENTRANCE PERSPECTIVE

COLLEGE OF ARCHITECTURE AND DESIGN

KANSAS STATE UNIVERSITY, MANHATTAN, KANSAS
MASTER THESIS
THE DESIGN OF MODERNIZING SCHOOLS FOR THAILAND
SAJEEW PANDIT
SILVER PRIZE - PROF. THOMAS J. DRAKE

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THE DESIGN OF CONTEMPORARY SCHOOLS
FOR THAILAND

by

MANOP BONGSADADT

B. A., Chulalongkorn University, 1964

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF ARCHITECTURE

Department of Architecture and Design

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1968

Thailand, an ancient country in southeast Asia had been known as Siam. The country had been ruled by monarchy for hundreds of years. On June 24, 1920, democracy was accomplished by revolutionary government, and the first prime minister was elected. Under the new government, Thailand was very anxious to reap the fruits of this new democracy in social, economic, and cultural terms and provide the basic elements of "good life and good education" for the common man within the context of a socialistic pattern of society. For this purpose, coordinated and comprehensive plans of economic, agricultural, and industrial development have been implemented, through which resources may be generated for developing the country.

Hence, it seems clear that education in Thailand must first be used as an instrument to provide a common base of human experience and to create the manpower for her vast range of people.

By the above reasons, the design for a school complex at Bang-Auo Community, Bangkok, Thailand, has been developed. This school provides the educational spaces for the demand of expanding residential and small industrial areas, eight miles southwest of Bangkok.

In this thesis, the outline has been broken down into seven main parts:

1. Geographical and physical background of Thailand
2. History of education in Thailand
3. Educational systems in Thailand
4. Building materials in Thailand

5. The design for a school, Bang-Auo Community, Bangkok,
Thailand

6. The design concept

7. Presentations

This proposed project is designed to accommodate approximately 1,100 young people for pre-primary (kindergarten), elementary, and secondary schools in the same location. Also, the design of this proposed school complex is based on climatic conditions, environment, the use of local materials for economical construction, and the nature of the people.

Thus a new proposed project has been developed which is believed to create a healthy and safe atmosphere, better facilities, esthetic values, and also provide an answer to today's and tomorrow's education needs of the people of Thailand.